US010515414B2

(12) **United States Patent**
Pershing

(10) **Patent No.: US 10,515,414 B2**
(45) **Date of Patent: *Dec. 24, 2019**

(54) **SYSTEMS AND METHODS FOR PERFORMING A RISK MANAGEMENT ASSESSMENT OF A PROPERTY**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 923 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **13/844,467**

(22) Filed: **Mar. 15, 2013**

(65) **Prior Publication Data**

US 2013/0262029 A1 Oct. 3, 2013

Related U.S. Application Data

(63) Continuation-in-part of application No. 13/385,607, filed on Feb. 3, 2012, and a continuation-in-part of application No. 13/757,712, filed on Feb. 1, 2013, now Pat. No. 8,774,525, and a continuation-in-part of application No. PCT/US2013/023503, filed on Jan. 28, 2013, and a continuation-in-part of application No. 13/385,606, filed on Feb. 3, 2012, now Pat. No. 9,933,257, and a continuation-in-part of application No. 13/757,694, filed on Feb. 1, 2013, now Pat. No. 9,599,466, and a continuation-in-part of application No. PCT/US2013/023502, filed on Jan. 28, 2013.

(51) **Int. Cl.**

G01B 21/28	(2006.01)
G06Q 40/08	(2012.01)
G06Q 40/00	(2012.01)
G06Q 10/06	(2012.01)
G06Q 50/16	(2012.01)
C01B 21/28	(2006.01)

(52) **U.S. Cl.**
CPC ***G06Q 40/08*** (2013.01); ***C01B 21/28*** (2013.01); ***G01B 21/28*** (2013.01); ***G06Q 10/06*** (2013.01); ***G06Q 40/00*** (2013.01); ***G06Q 50/16*** (2013.01)

(58) **Field of Classification Search**
CPC G06Q 10/06; G06Q 40/08; G06Q 50/16; G01B 21/28; G06F 17/00
See application file for complete search history.

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(57) **ABSTRACT**

A system generates an estimated floor area measurement of a building based on the calculated estimated total roof area of the roof of the building. This is based on a correlation between the size of the building roof and the size of the building. Typically, the floor area of a single full floor of the building is roughly the size of the roof of the building if the roof were flat with no slope. This in effect is turning the roof into a floor to generate estimated floor area. With additional adjustments to area measurements to account for multiple floors, roof overhang, wall width, internal building features such as walls and staircases, and/or obstructed views of the building in the aerial image(s), etc., an even more accurate floor area estimation may be generated.

13 Claims, 37 Drawing Sheets

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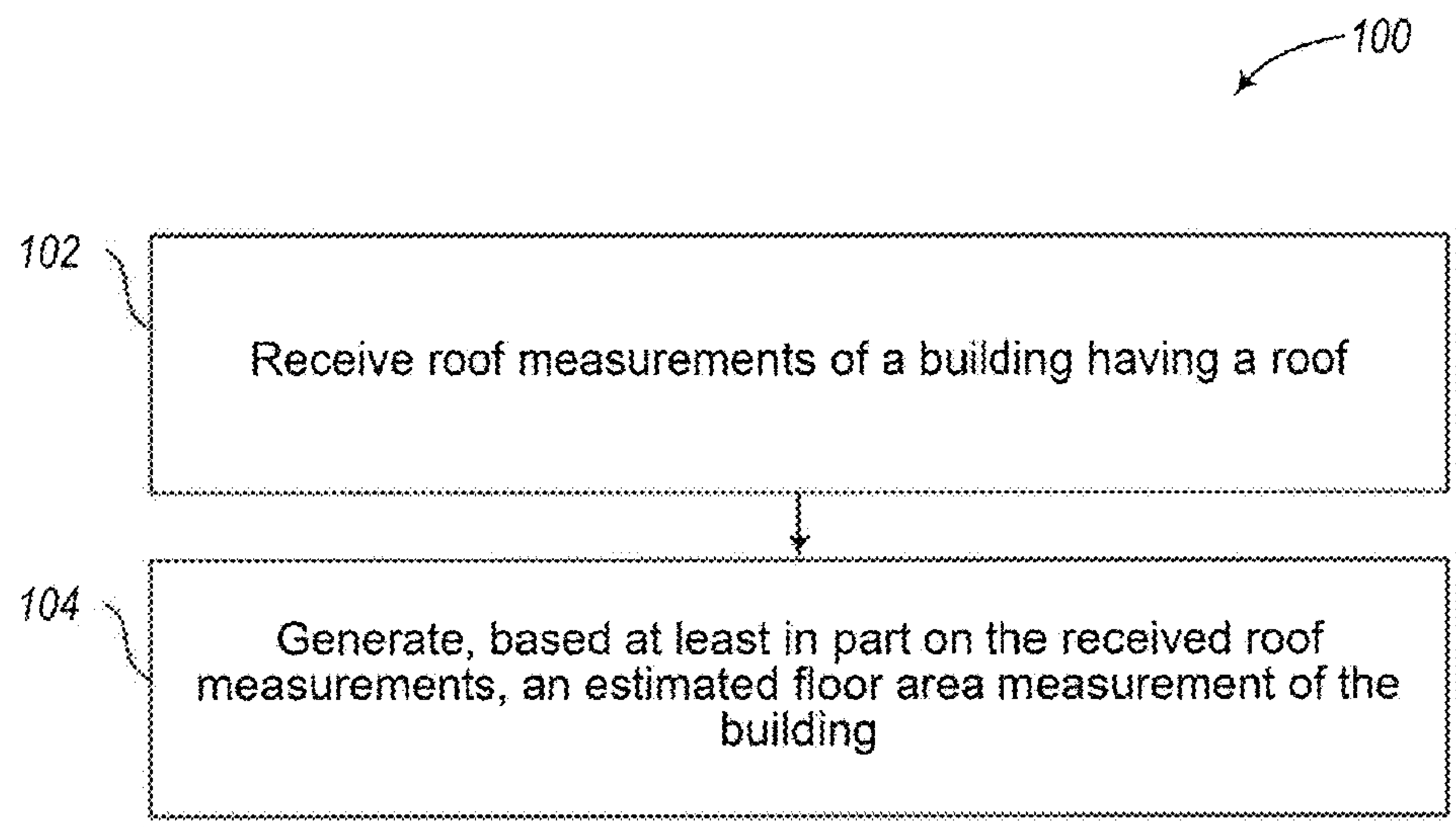

100
102
Receive roof measurements of a building having a roof
104
Generate, based at least in part on the received roof measurements, an estimated floor area measurement of the building

Fig. 1A

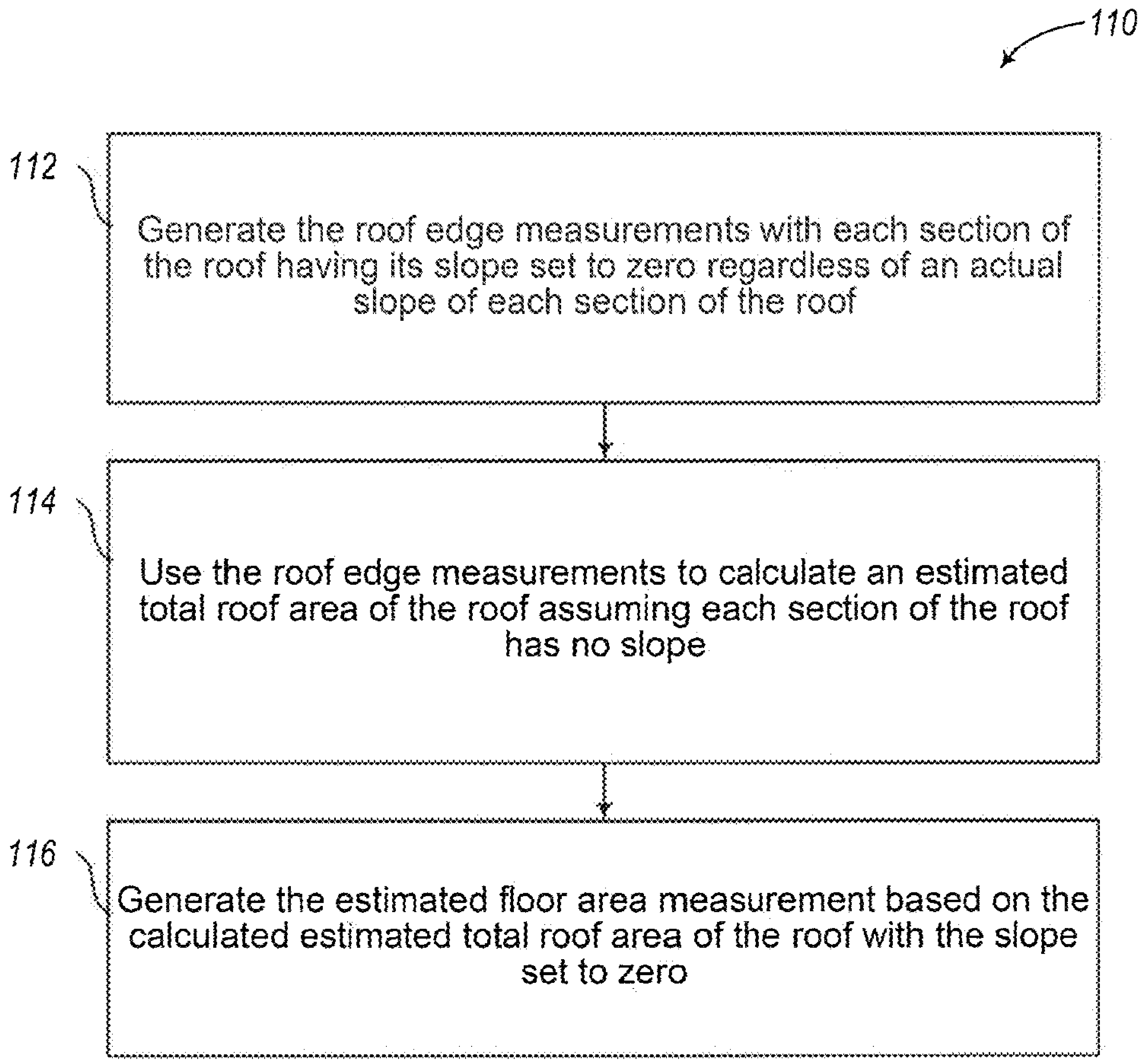

110
112
Generate the roof edge measurements with each section of the roof having its slope set to zero regardless of an actual slope of each section of the roof
114
Use the roof edge measurements to calculate an estimated total roof area of the roof assuming each section of the roof has no slope
116
Generate the estimated floor area measurement based on the calculated estimated total roof area of the roof with the slope set to zero

Fig. 1B

120

122 Subtract an amount from one or more of the roof edge measurements corresponding to an estimated roof overhang over one or more walls of the building to obtain adjusted roof edge measurements

124 Subtract an amount from one or more of the adjusted roof edge measurements corresponding to an estimated wall width to obtain adjusted roof edge measurements

126 Receive information regarding floor area spaces of the building that are not to be included in the estimated floor area measurement of the building

128 Generate an initial estimated floor area measurement based on an area corresponding to an extent to which the spaces extend under the roof and based on the adjusted roof edge measurements

130 Generate the estimated floor area measurement based on information received regarding a number of stories of the building

Fig. 1C

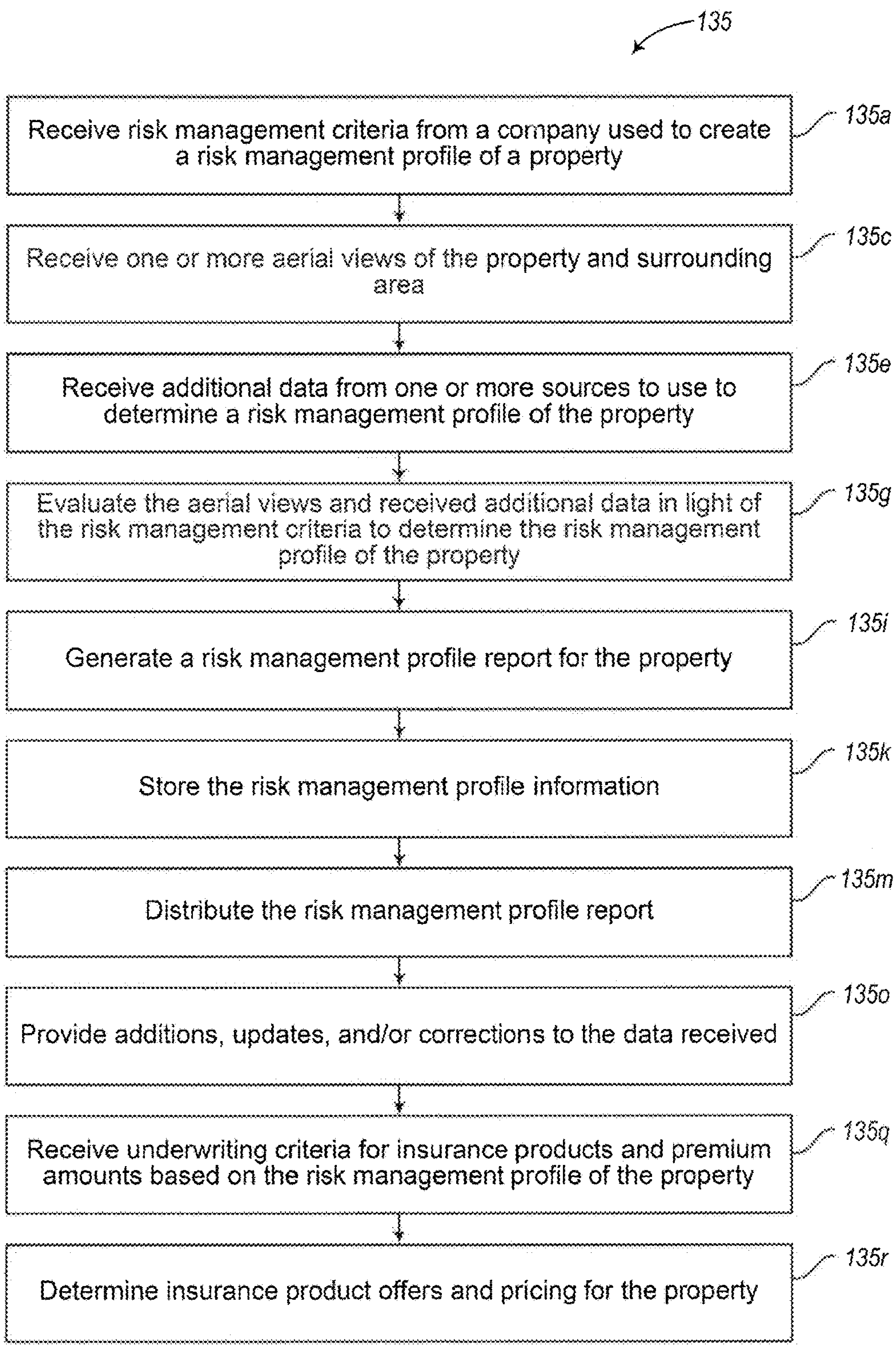

135
Receive risk management criteria from a company used to create a risk management profile of a property
135a
Receive one or more aerial views of the property and surrounding area
135c
Receive additional data from one or more sources to use to determine a risk management profile of the property
135e
Evaluate the aerial views and received additional data in light of the risk management criteria to determine the risk management profile of the property
135g
Generate a risk management profile report for the property
135i
Store the risk management profile information
135k
Distribute the risk management profile report
135m
Provide additions, updates, and/or corrections to the data received
135o
Receive underwriting criteria for insurance products and premium amounts based on the risk management profile of the property
135q
Determine insurance product offers and pricing for the property
135r

Fig. 1D

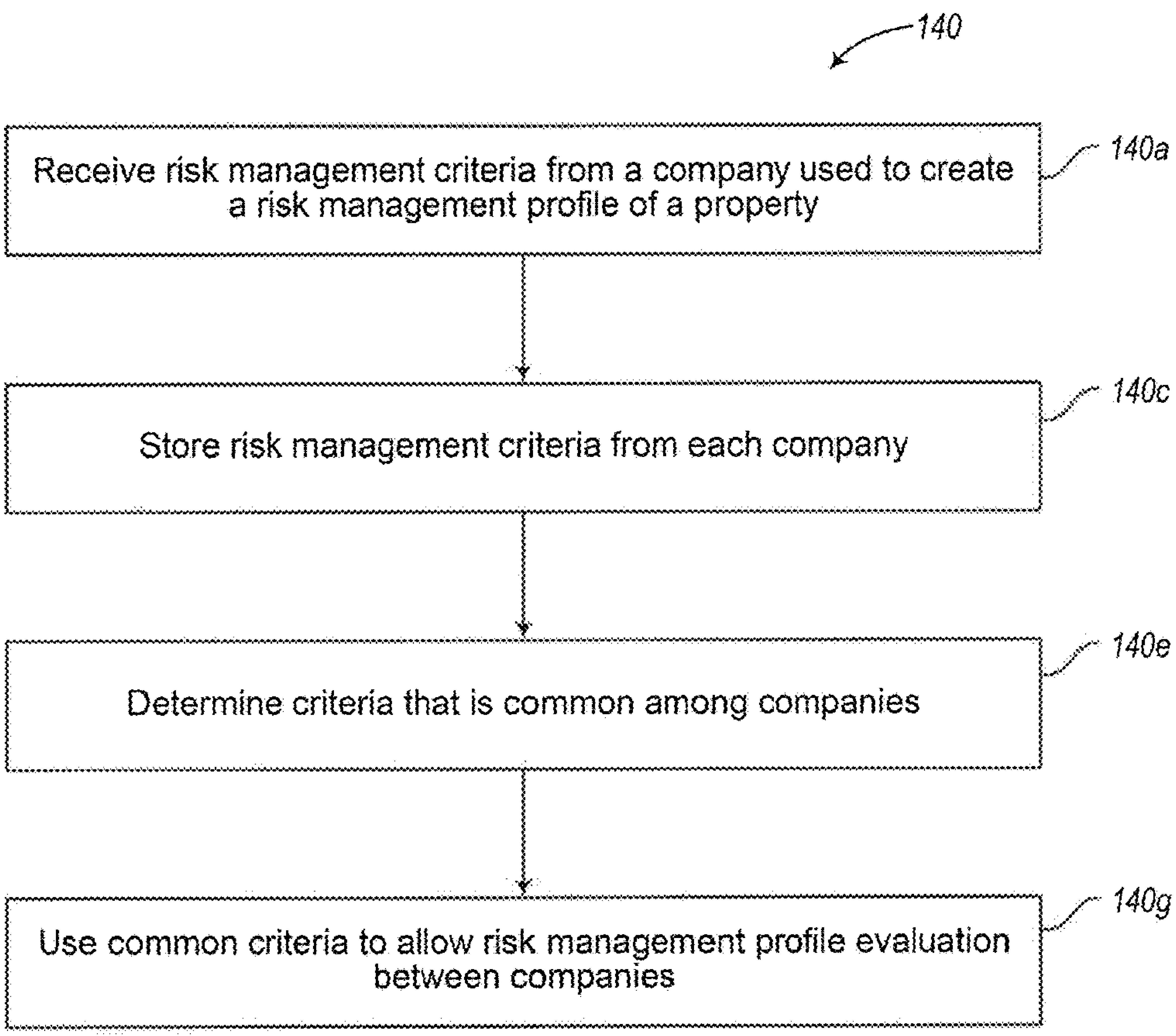

140
Receive risk management criteria from a company used to create a risk management profile of a property
140a
Store risk management criteria from each company
140c
Determine criteria that is common among companies
140e
Use common criteria to allow risk management profile evaluation between companies
140g

Fig. 1E

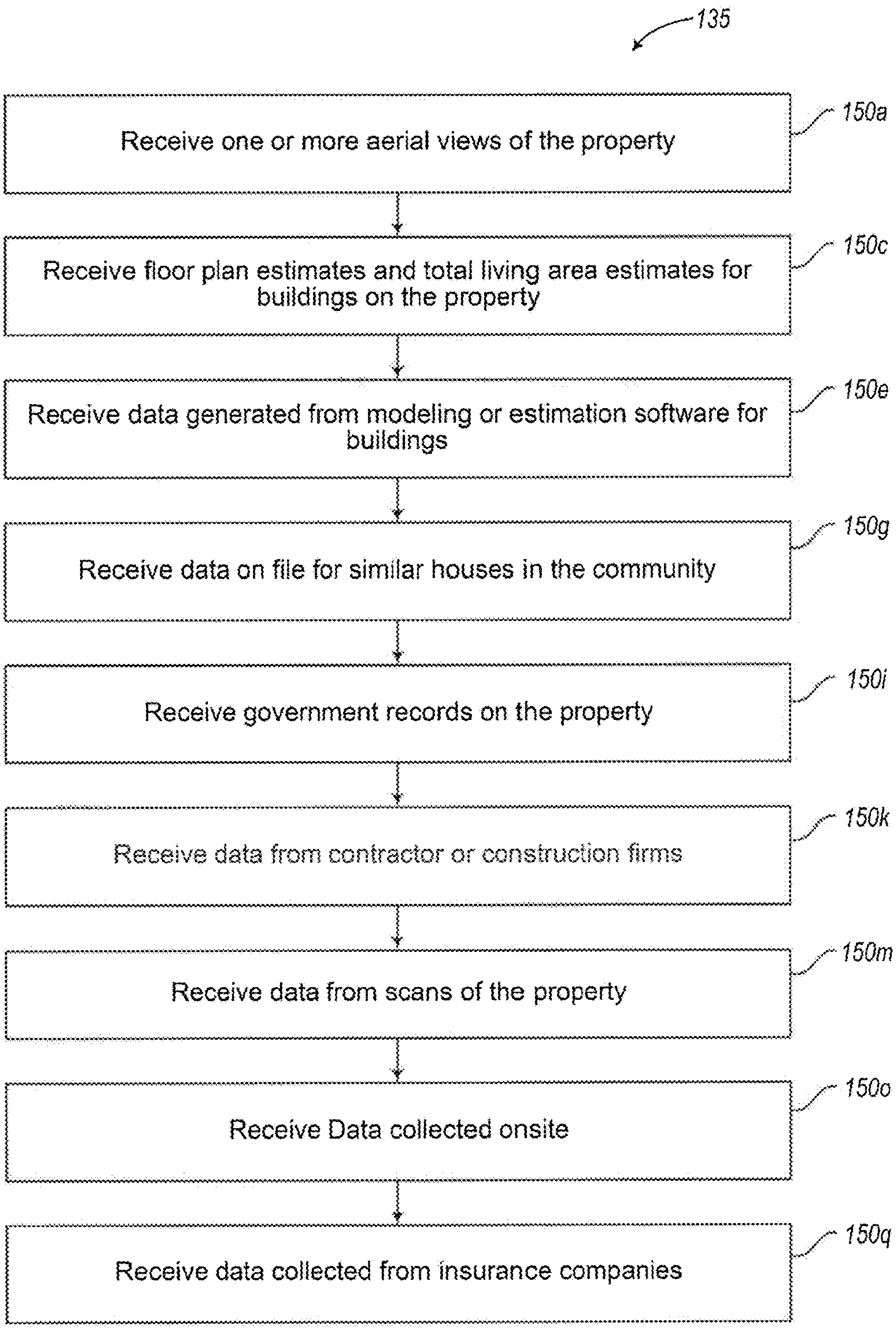

135
Receive one or more aerial views of the property
150a
Receive floor plan estimates and total living area estimates for buildings on the property
150c
Receive data generated from modeling or estimation software for buildings
150e
Receive data on file for similar houses in the community
150g
Receive government records on the property
150i
Receive data from contractor or construction firms
150k
Receive data from scans of the property
150m
Receive Data collected onsite
150o
Receive data collected from insurance companies
150q

Fig. 1F

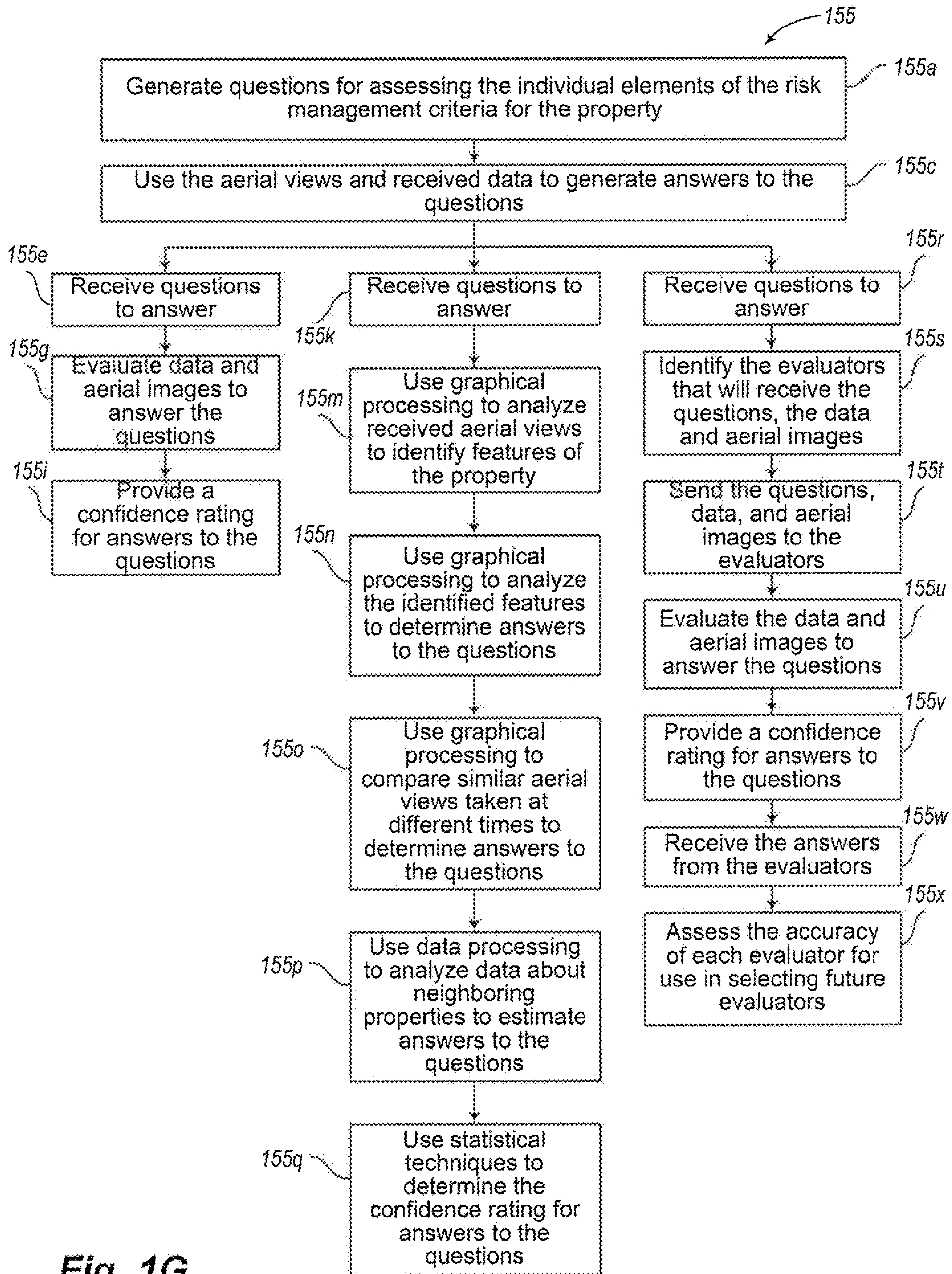

155
155a
Generate questions for assessing the individual elements of the risk management criteria for the property
155c
Use the aerial views and received data to generate answers to the questions
155e
Receive questions to answer
155g
Evaluate data and aerial images to answer the questions
155i
Provide a confidence rating for answers to the questions
155k
Receive questions to answer
155m
Use graphical processing to analyze received aerial views to identify features of the property
155n
Use graphical processing to analyze the identified features to determine answers to the questions
155o
Use graphical processing to compare similar aerial views taken at different times to determine answers to the questions
155p
Use data processing to analyze data about neighboring properties to estimate answers to the questions
155q
Use statistical techniques to determine the confidence rating for answers to the questions
155r
Receive questions to answer
155s
Identify the evaluators that will receive the questions, the data and aerial images
155t
Send the questions, data, and aerial images to the evaluators
155u
Evaluate the data and aerial images to answer the questions
155v
Provide a confidence rating for answers to the questions
155w
Receive the answers from the evaluators
155x
Assess the accuracy of each evaluator for use in selecting future evaluators

Fig. 1G

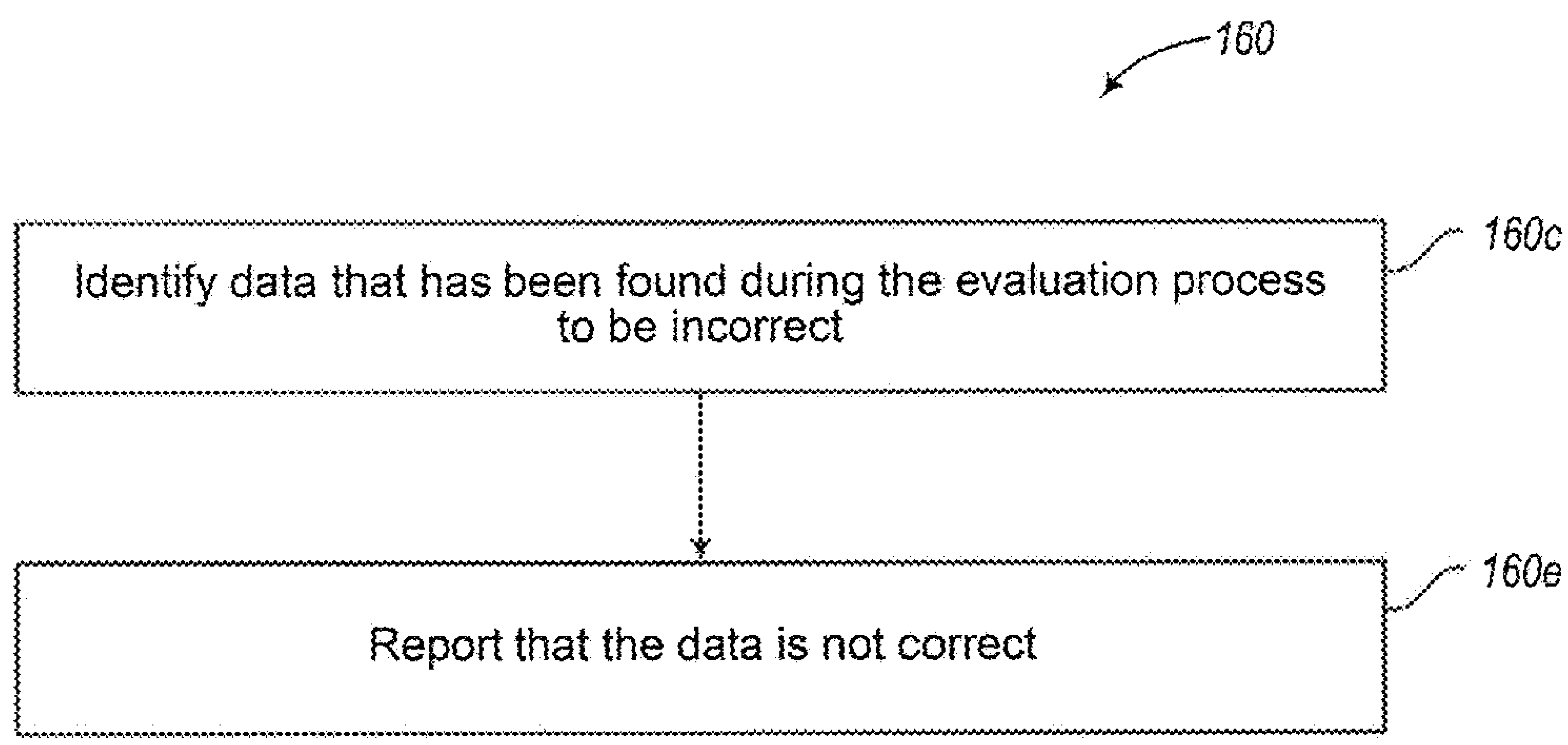

160
Identify data that has been found during the evaluation process to be incorrect
160c
Report that the data is not correct
160e

Fig. 1H

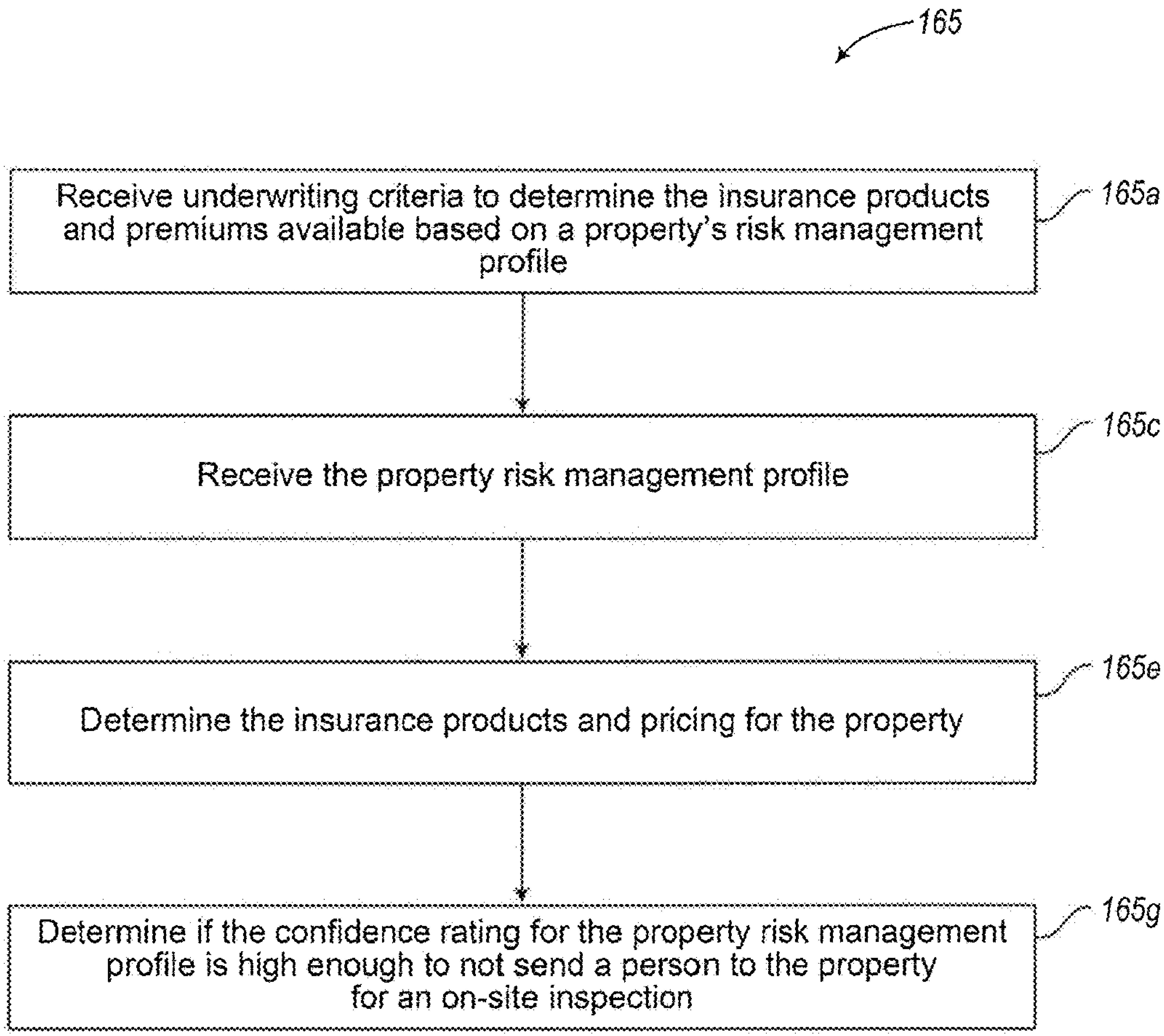

165
Receive underwriting criteria to determine the insurance products and premiums available based on a property's risk management profile
165a
Receive the property risk management profile
165c
Determine the insurance products and pricing for the property
165e
Determine if the confidence rating for the property risk management profile is high enough to not send a person to the property for an on-site inspection
165g

Fig. 1I

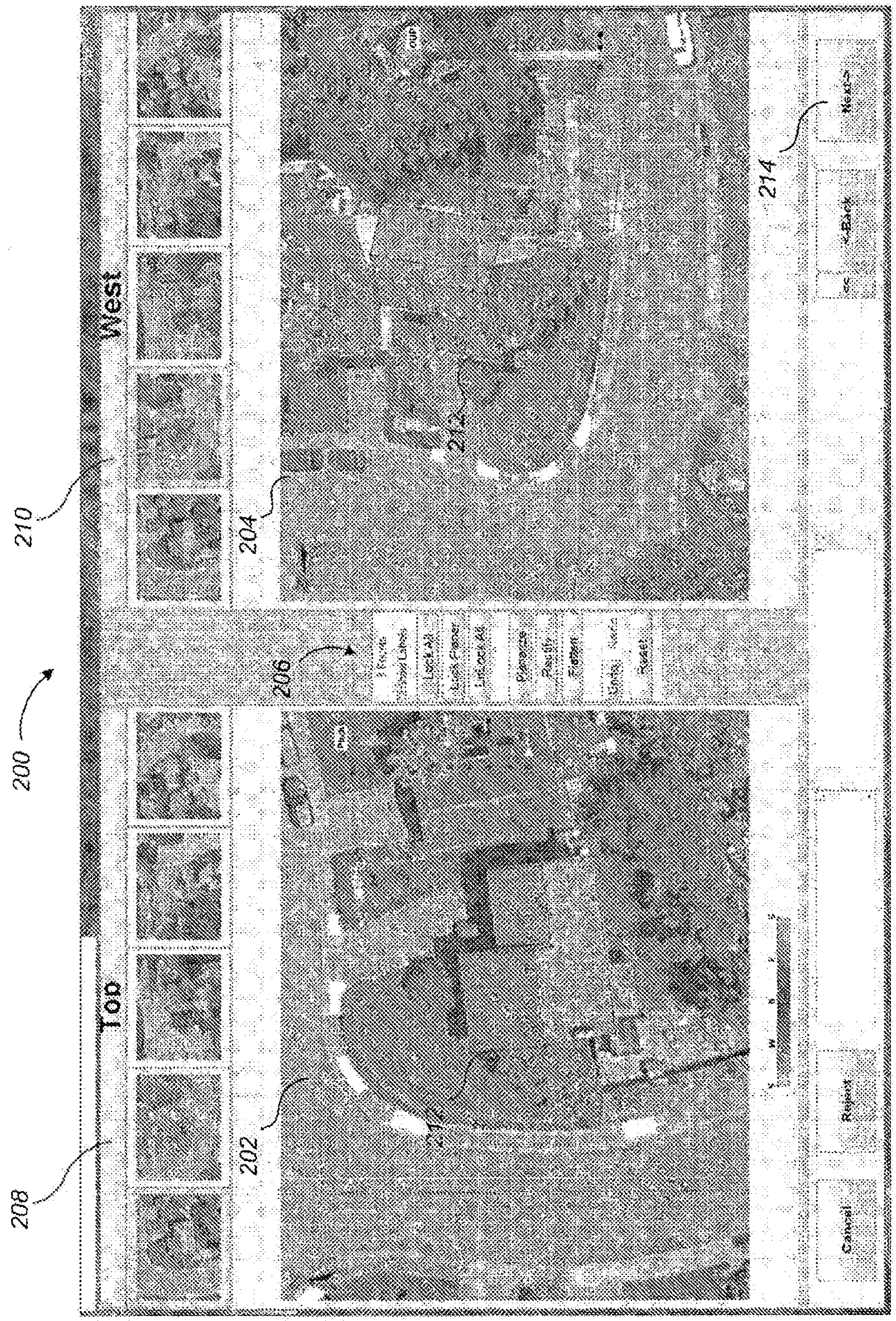

200
208
210
202
204
206
212
214
Top
West
Lock All
Reset
Reject
Cancel
<-Back
Next->

Fig. 2

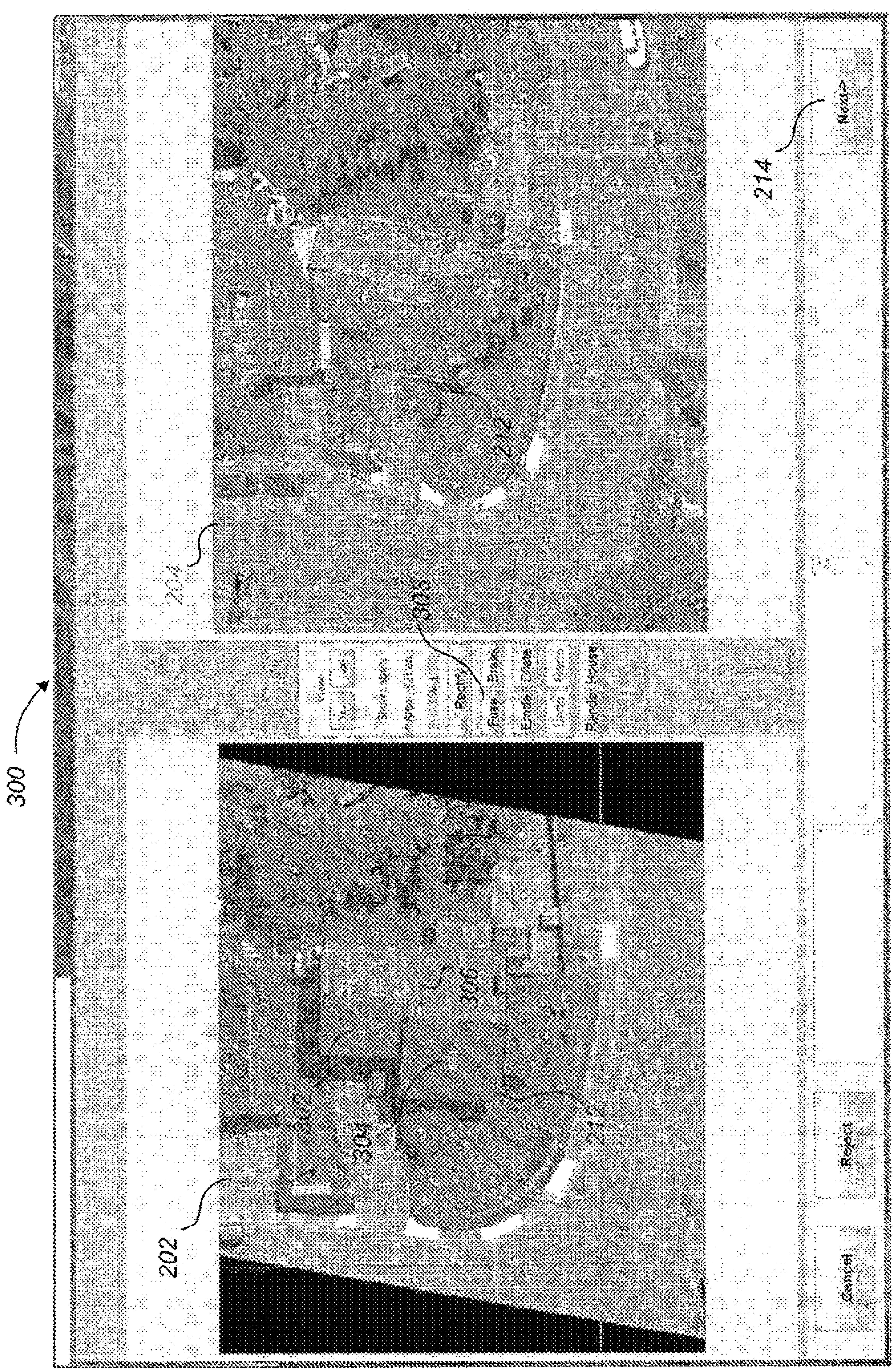


Fig. 3

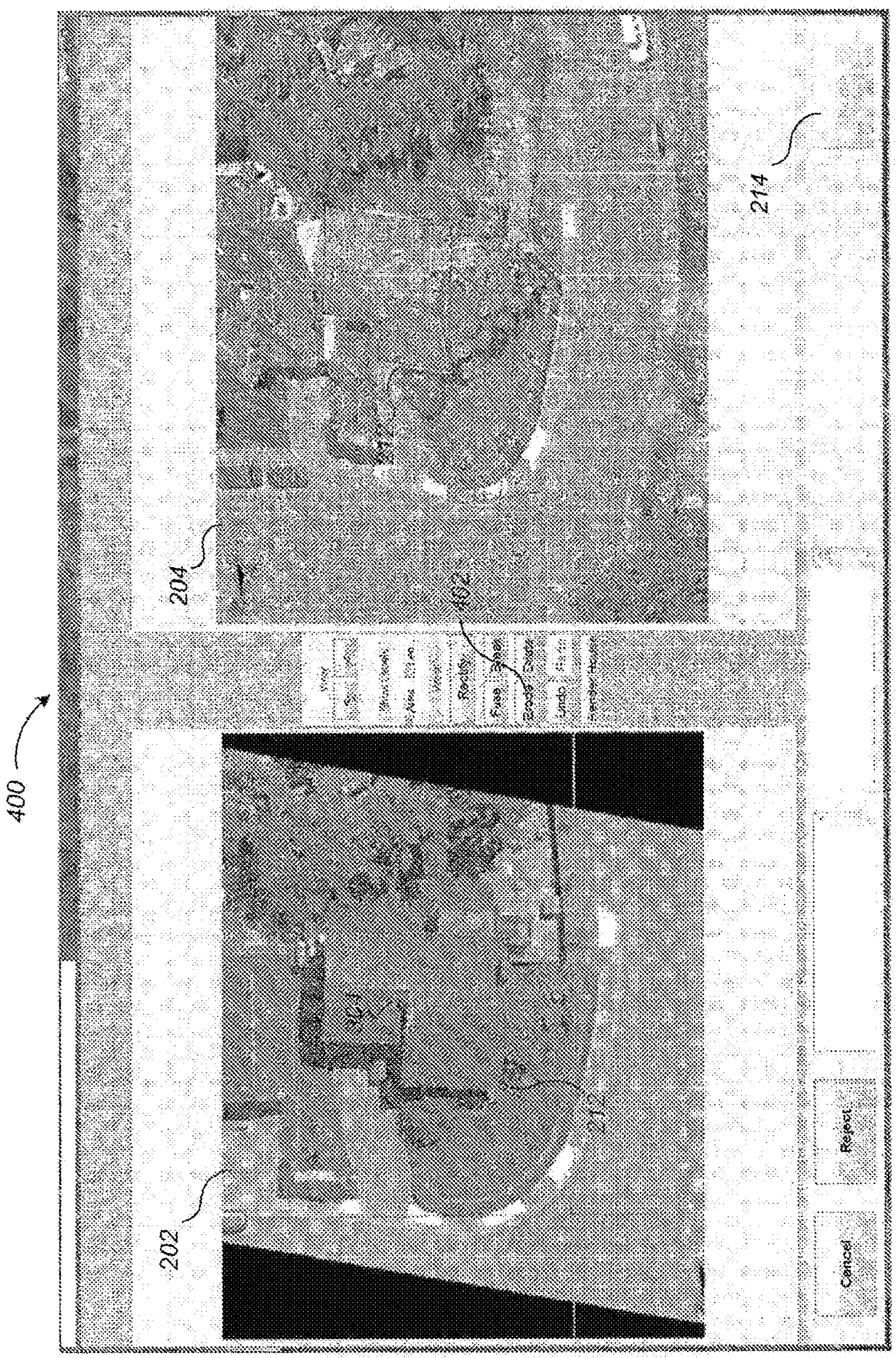


Fig. 4

Fig. 5

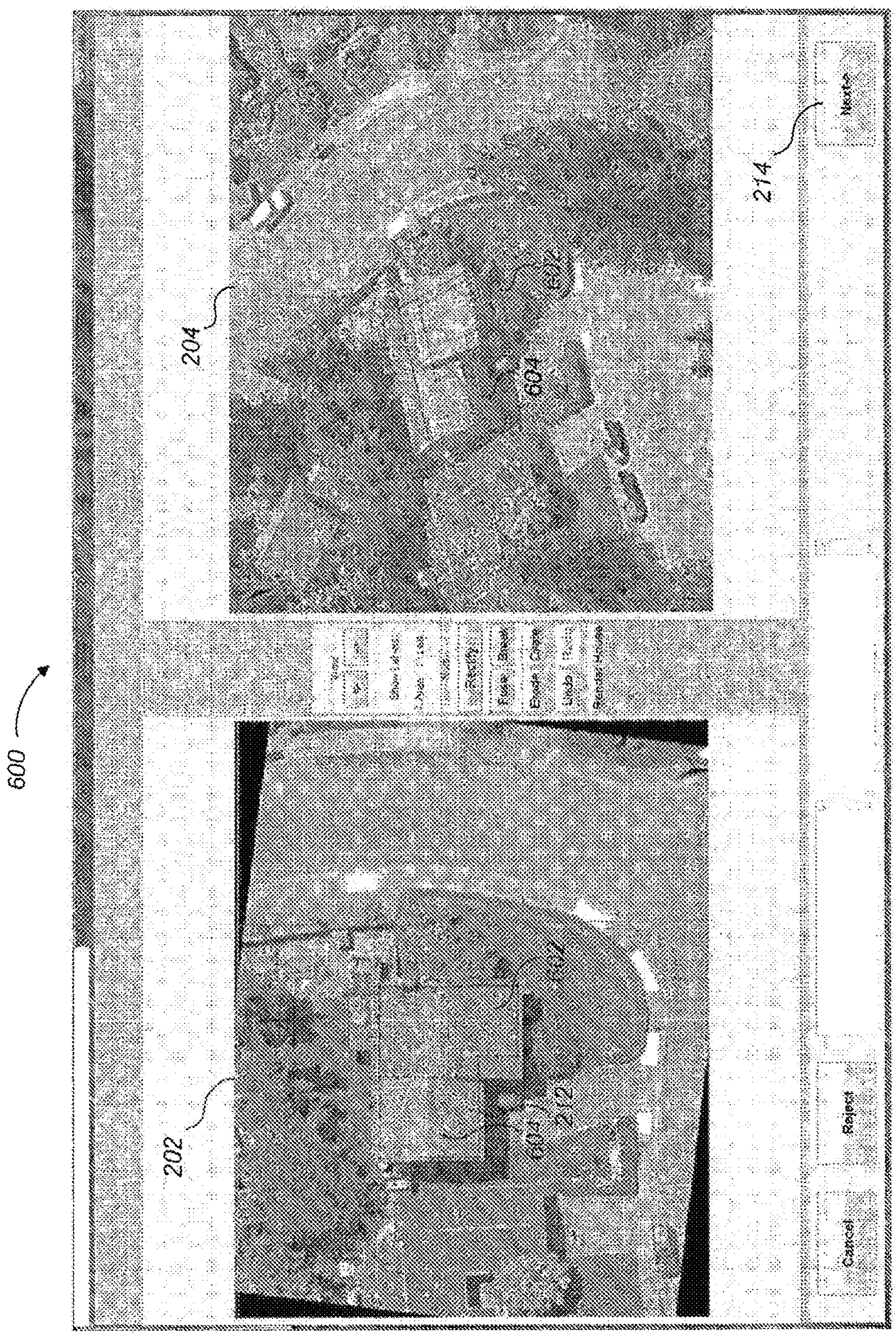


Fig. 6

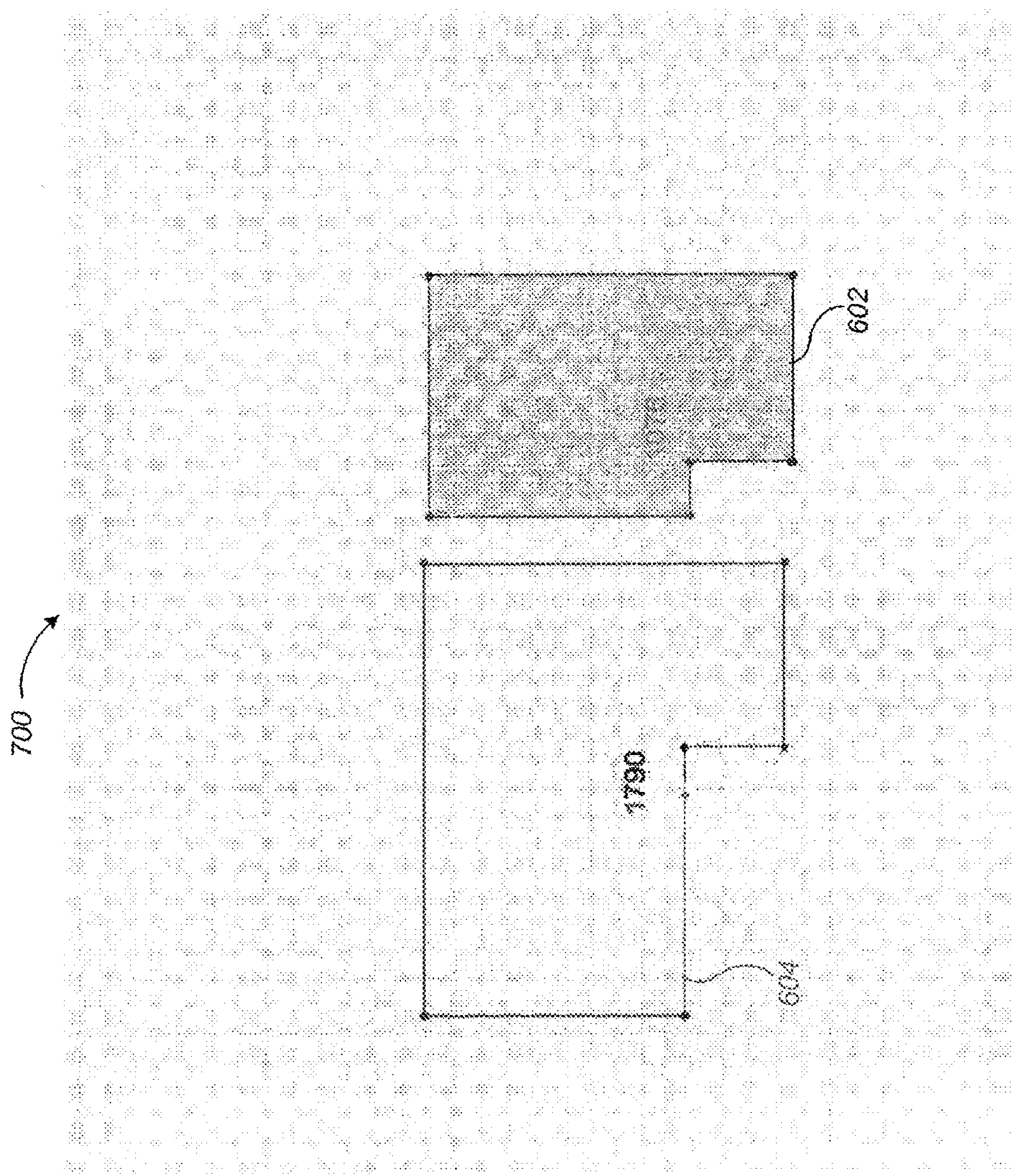


Fig. 7

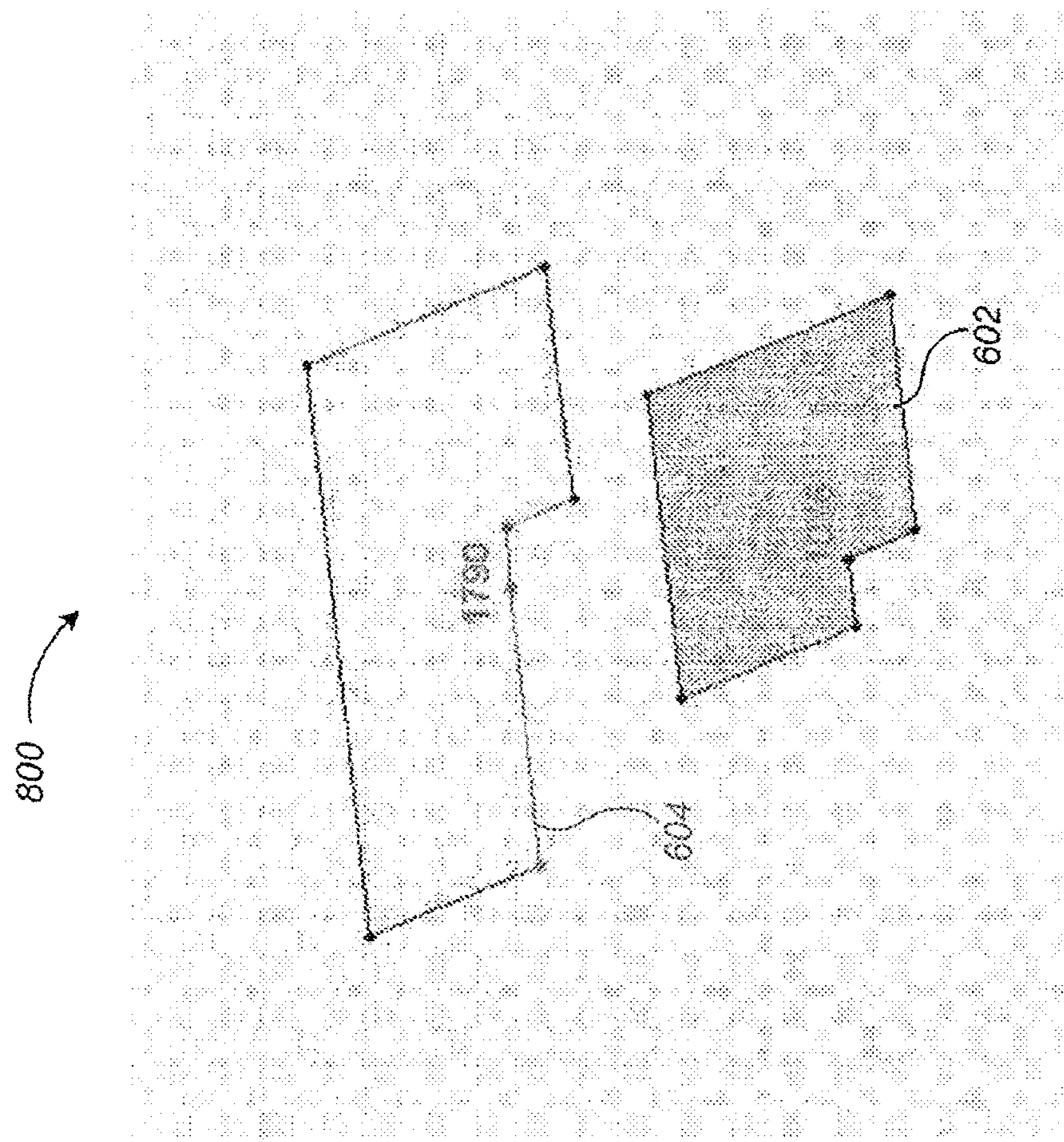
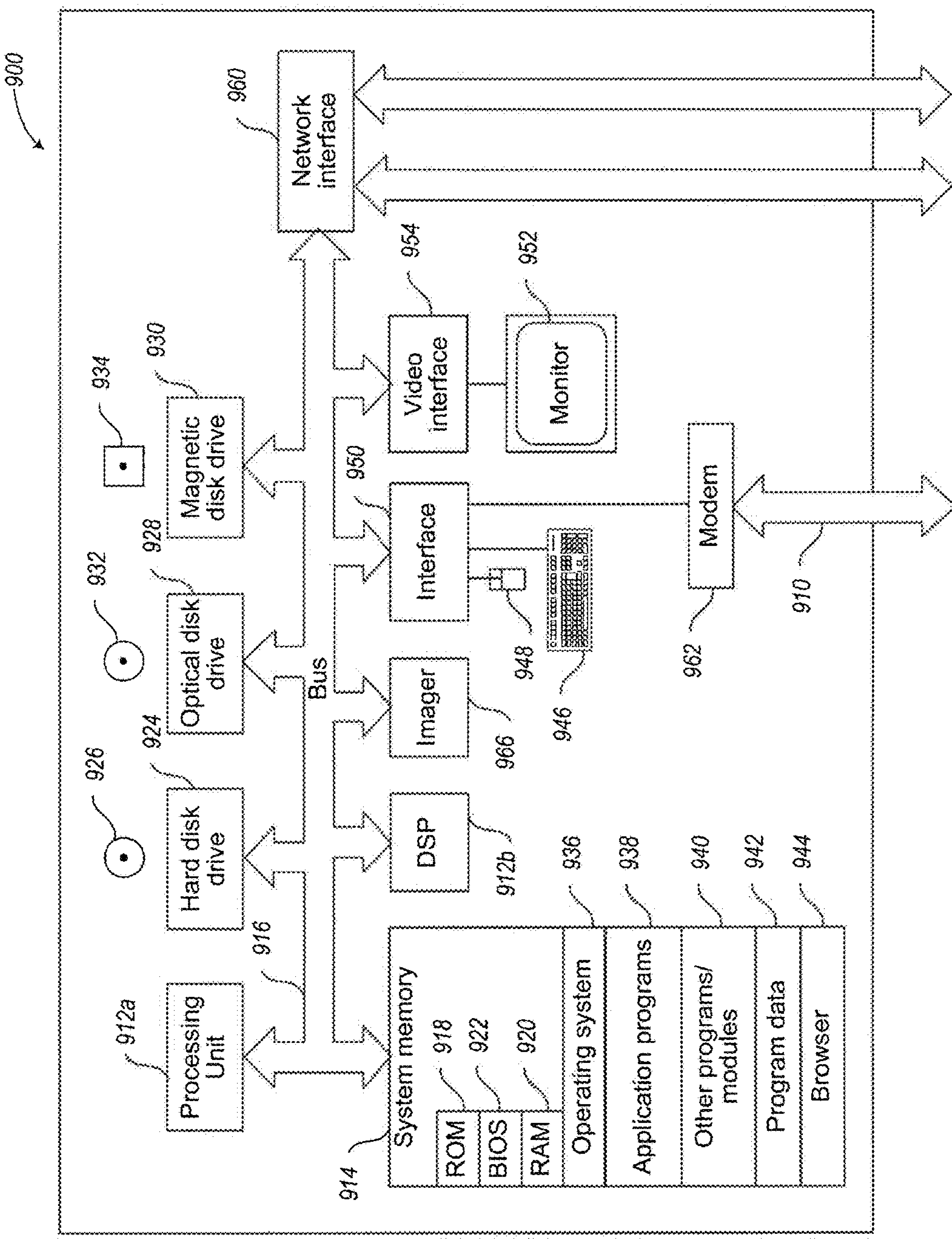


Fig. 8



900
Processing Unit
912a
Hard disk drive
926
924
Optical disk drive
932
928
Magnetic disk drive
934
930
Network interface
960
916
Bus
System memory
914
ROM
918
BIOS
922
RAM
920
Operating system
936
Application programs
938
Other programs/ modules
940
Program data
942
Browser
944
DSP
912b
Imager
966
Interface
950
948
946
Video interface
954
Monitor
952
Modem
962
910

Fig. 9


702
Floor Plan Editor
Facet Label Editor
West
Show Labels
Area
Rectify
Fuse
Break
Erode
Dilate
Undo
Redo
Checklist
Cancel
Reject
Finish
300
302
304
306
308
310
312
314
316
316a
316b
316c
316d
316e
316f
316g
316h
316i
318a
318b
320
322
324
326
328
330
332

Fig. 10


704
Floor Plan Editor
306
336
338
Facet Label Editor
Top
340
View:
Show Labels:
Area
Len.
Rectify
Fuse
Break
Erode
Dilate
Undo
Redo
Checklist
316g
Cancel
Reject
Finish

Fig. 11

706


Floor Plan Editor
Facet Label Editor
East
342
View
Show Labels
Rectify
Fuse
Break
Erode
Dilate
Undo
Redo
Checklist
Cancel
Reject
Finish

Fig. 12


708
344
346
Floor Plan Editor
Facet Label Editor
North
View:
Show Labels:
Area
Len
Rectify
Fuse
Break
Erode
Dilate
Undo
Redo
Checklist
Cancel
Reject
Finish

Fig. 13

710
Floor Plan Editor
Facet Label Editor
North
View:
Show Labels:
Area
Len.
Rectify
Fuse
Break
Erode
Dilate
Undo
Redo
Checklist
Facet Types
348
Cancel
Reject
Finish

Fig. 14


712
Floor Plan Editor
Facet Label Editor
Top
340
View:
Show Labels:
Rectify
Fuse
Break
Erode
Dilate
Undo
Redo
Checklist
Cancel
Reject
Finish
326

Fig. 15

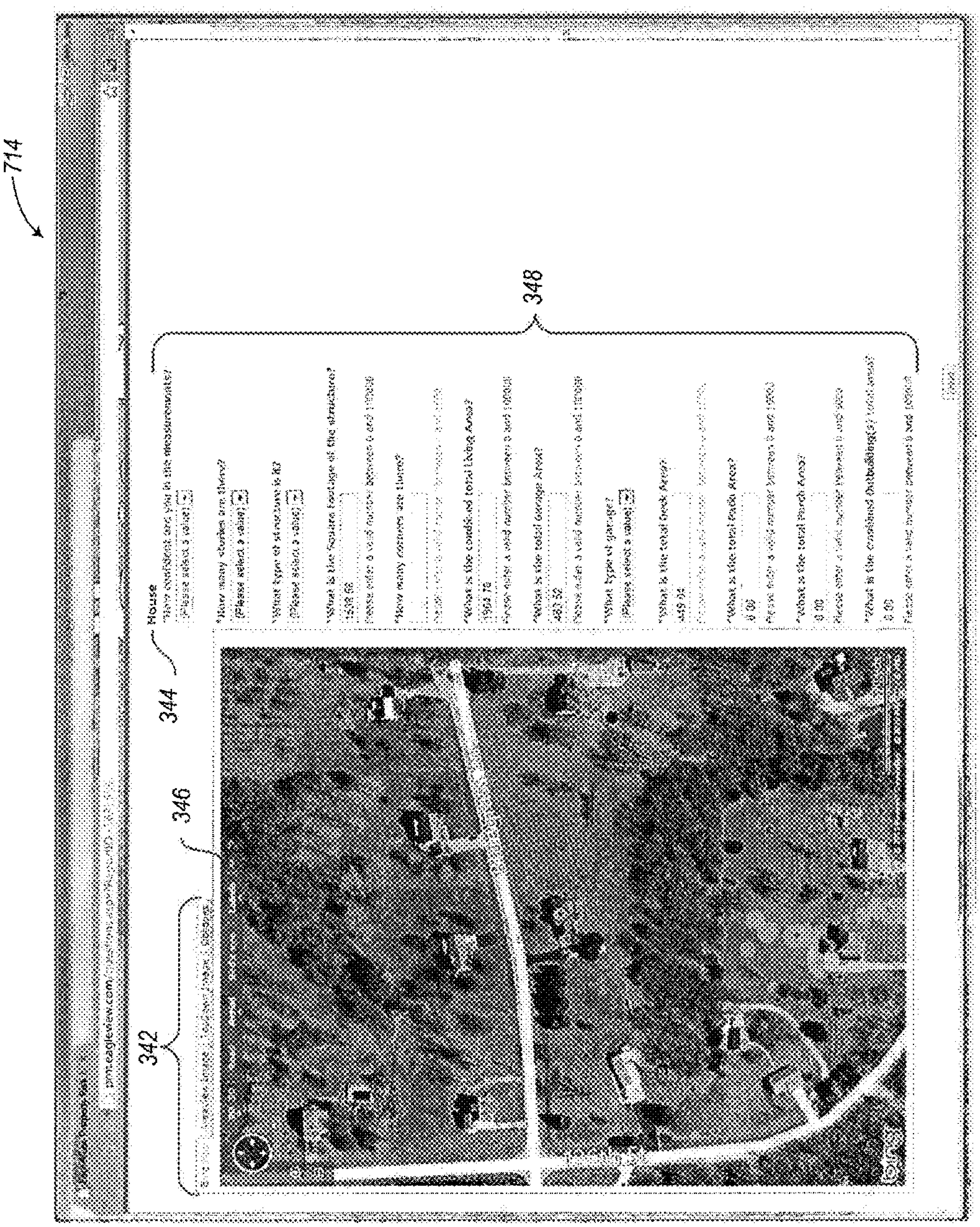


Fig. 16

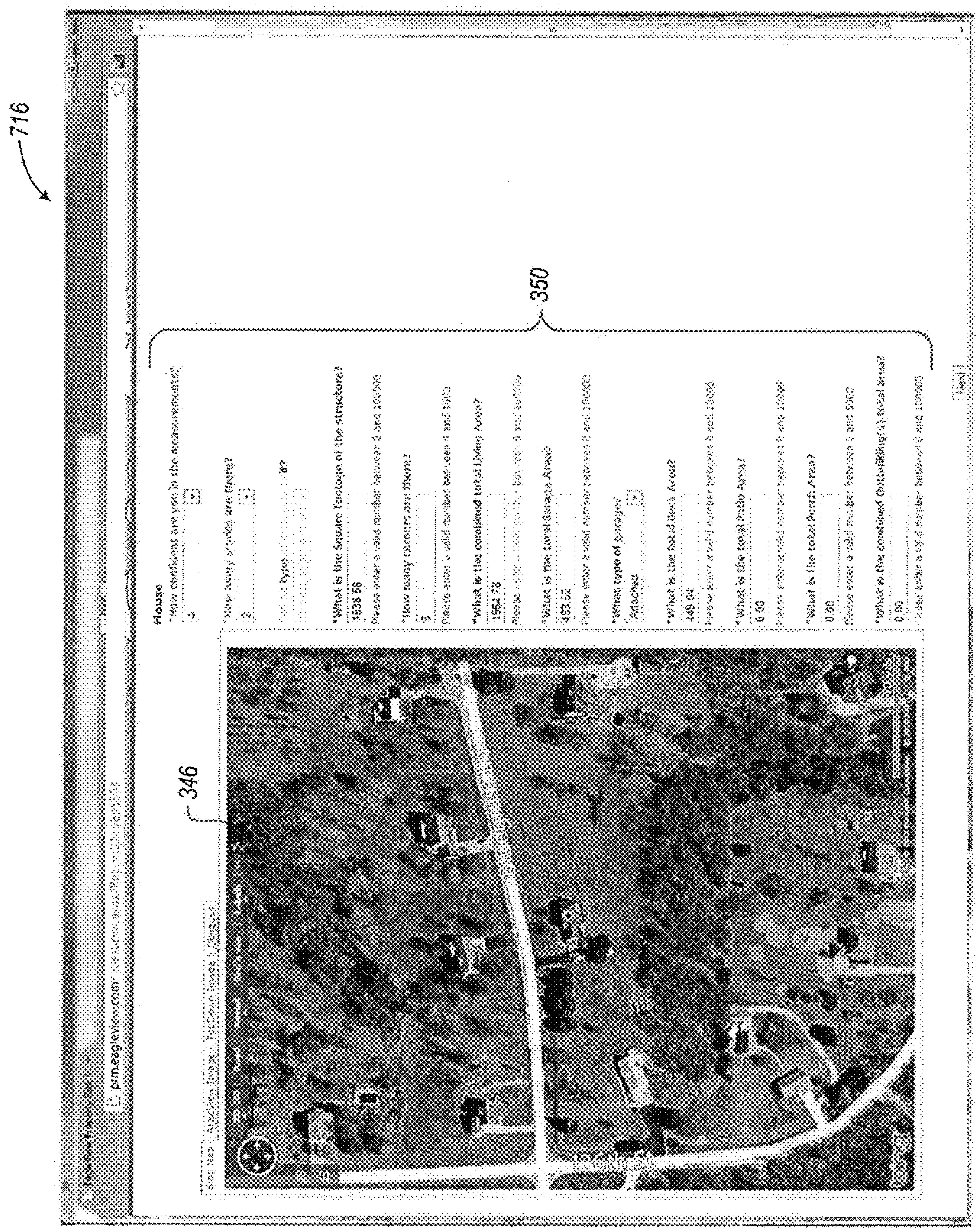


Fig. 17

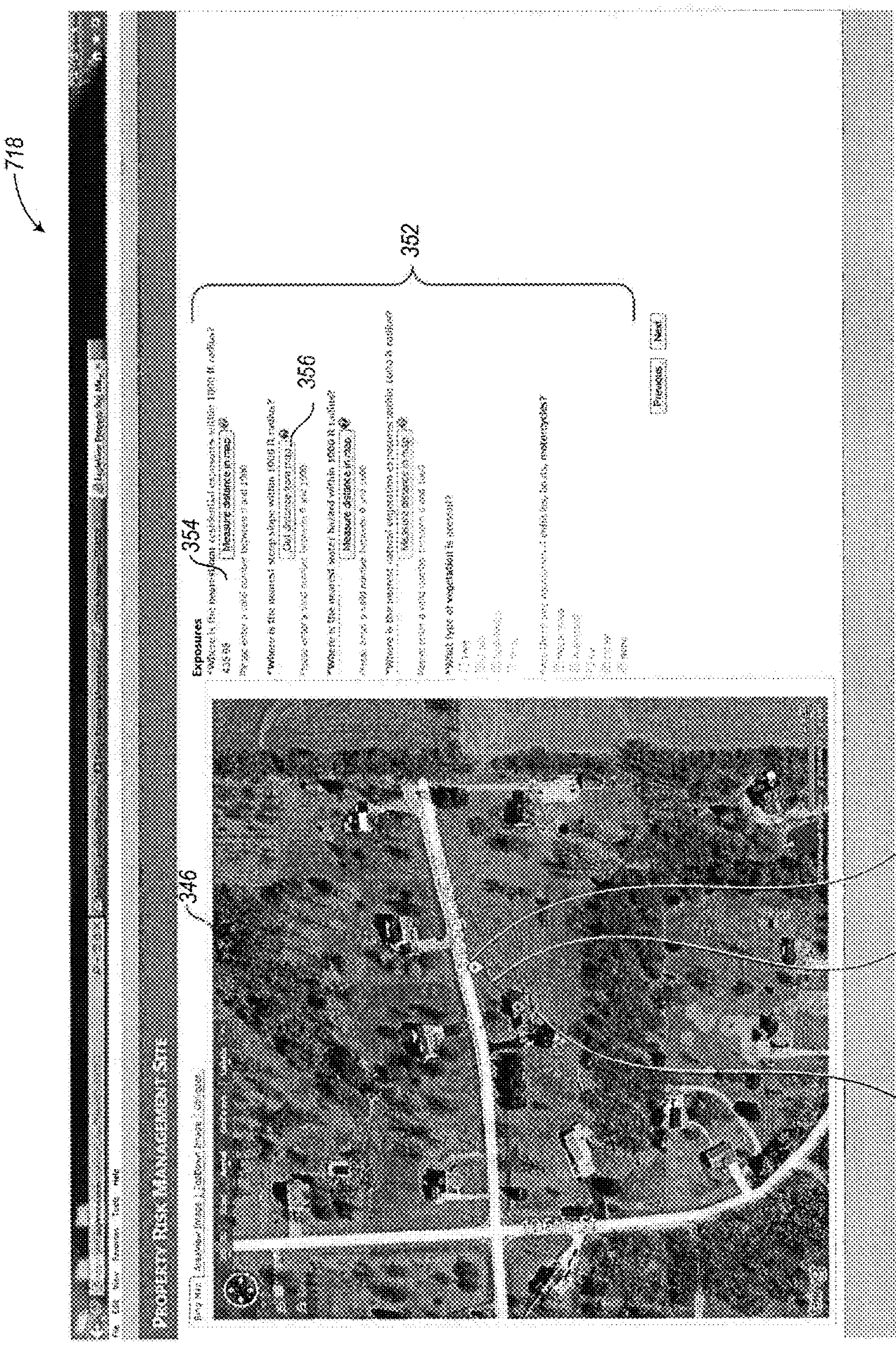

718
352
354
356
346
360
362
358
Exposures
Measure distance in map
Previous
Next

Fig. 18

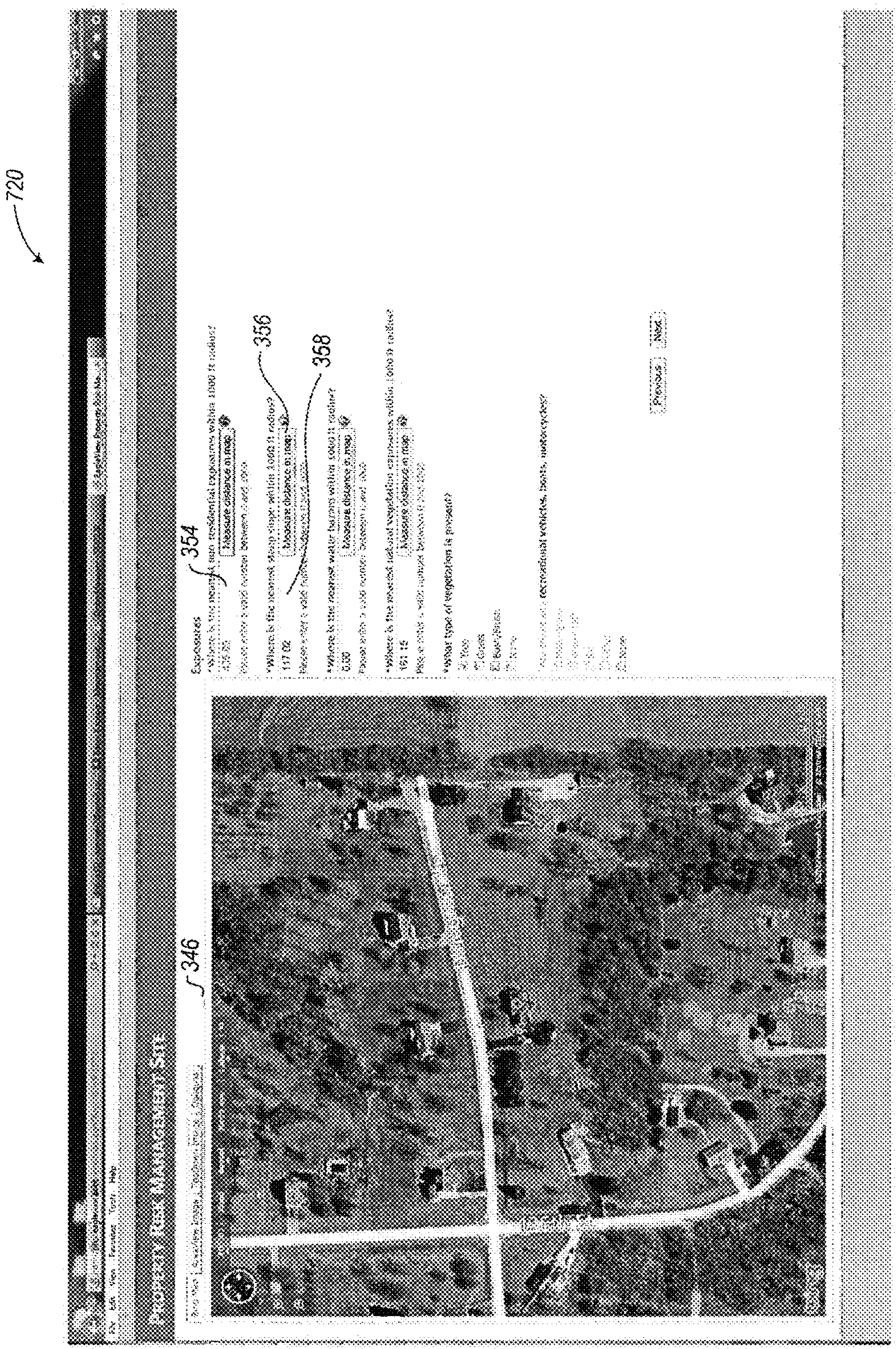

720
346
354
356
358
Property Risk Management Site
Exposures
Measure distance in map
Previous
Next

Fig. 19

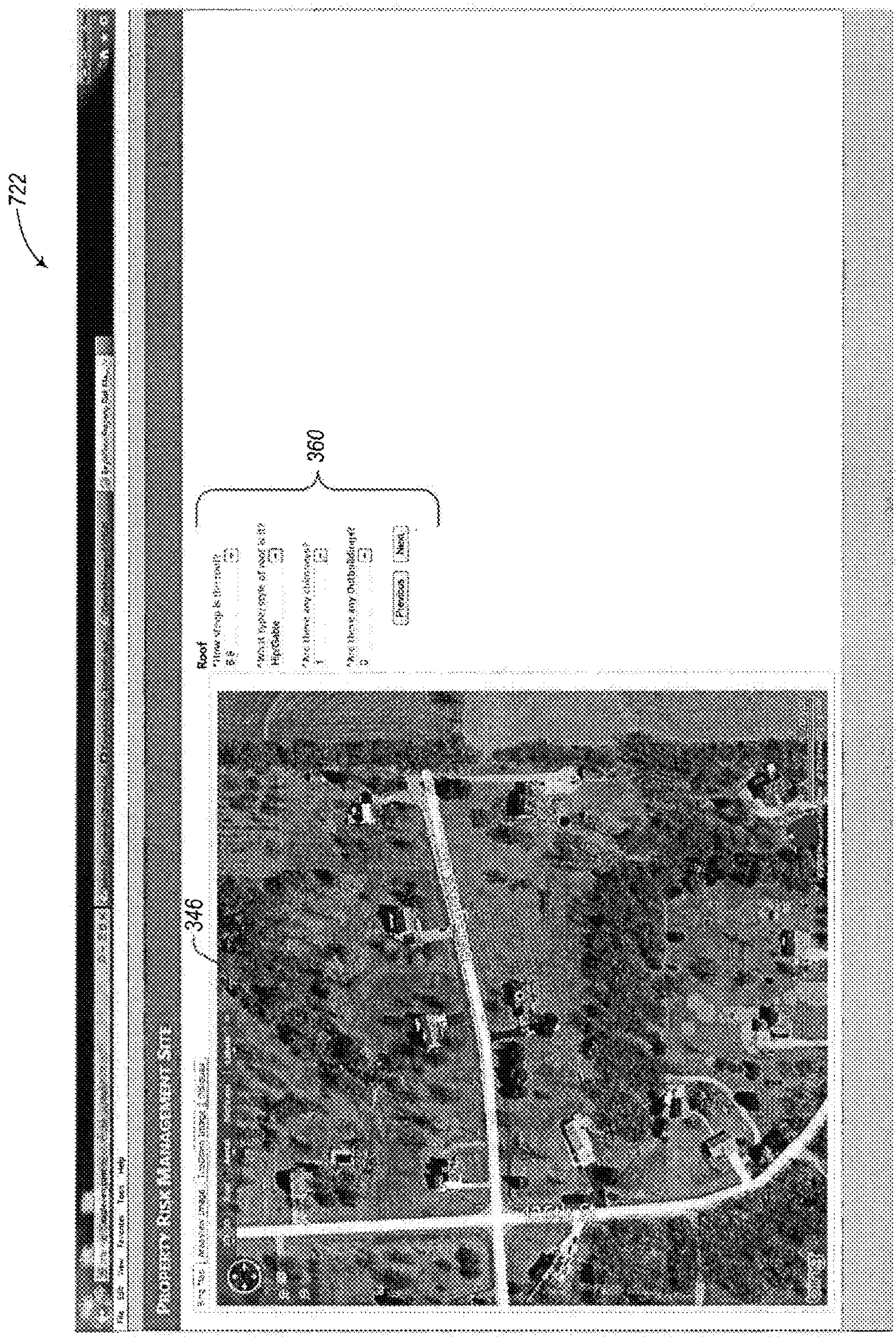

722
Property Risk Management Site
346
360
Roof
Hip/Gable
Previous
Next

Fig. 20

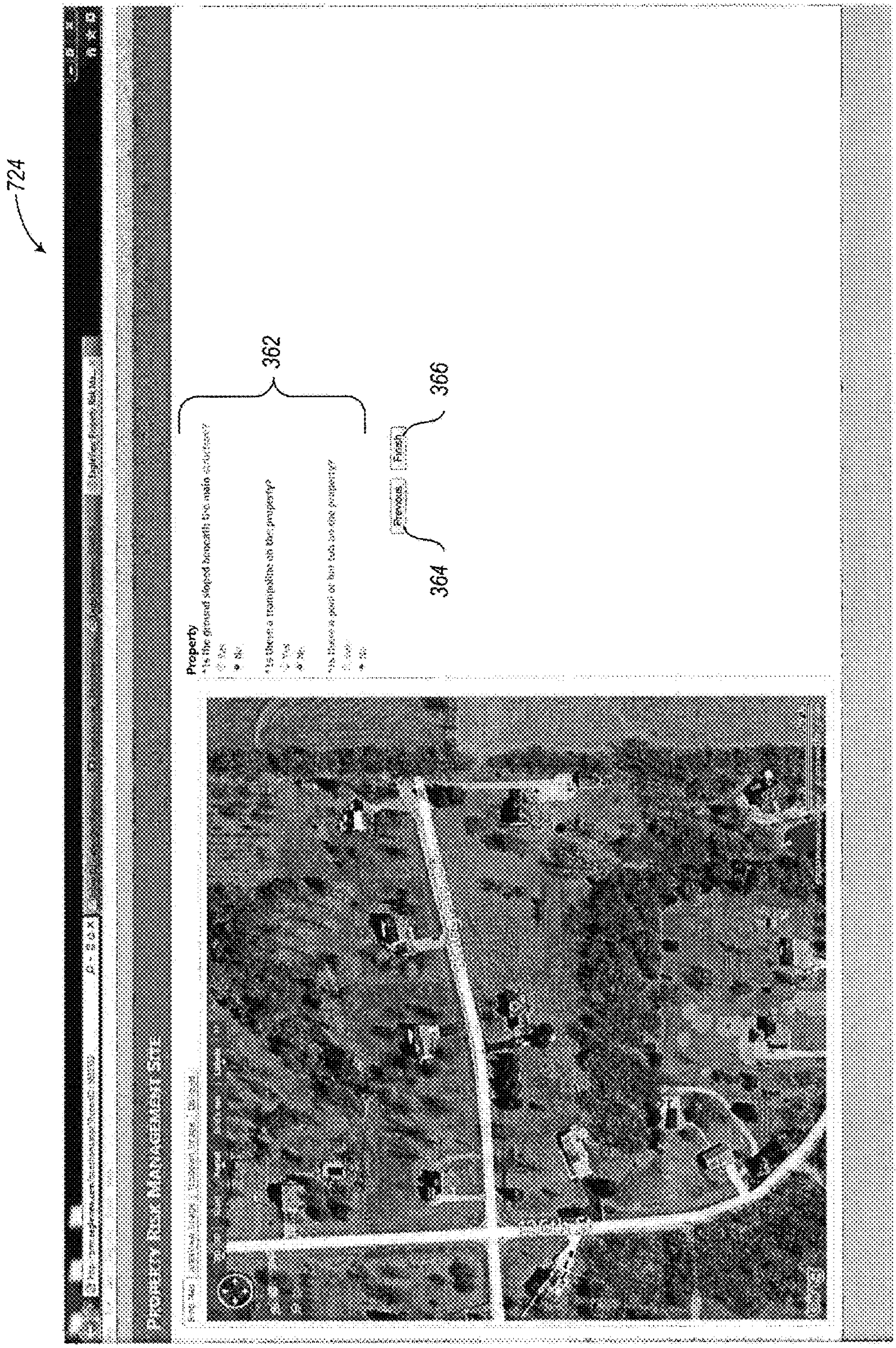
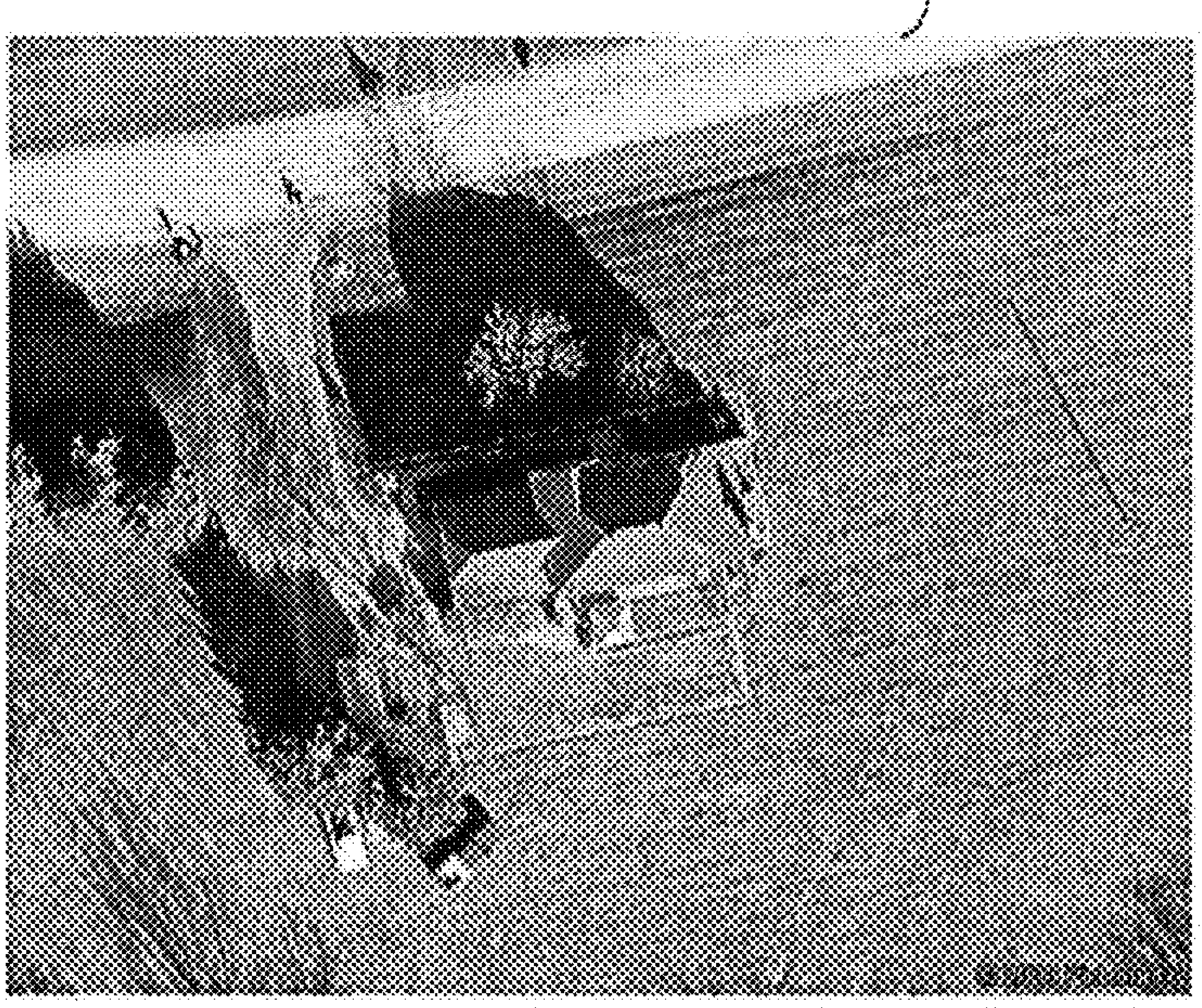


Fig. 21

726

EAGLEVIEW®
Technologies

368



PROPERTY RISK MANAGEMENT REPORT

370

Custom Residential Report

Report Date: ** <Date.
Property: 123 Main St., Anytown, WA 98xxx
Policy #: N/A

372

PREPARED FOR:
John Doe
EagleLuke Technologies
1234 First St.
Northerntown, WA 98xxx

374

Fig. 22

728

EAGLEVIEW Technologies

Property Risk Management Report

123 Main St., Anytown, WA 98xxx <Date>

REPORT DETAILS

Report:	5635553
Policy:	N/A
Renewal Date:	N/A
Date of Photo:	12/13/2006
Geocode:	40.2119742, 93.8694994

BUILDING SUMMARY

Year Built:	1983
Number of Stories:	2
Estimated Living Area:	1,965 sq. ft.
Garage (Attached):	484 sq. ft.

REPORT CONTENTS

PREPARED FOR:
EagleLuke Technologies

Fig. 23

730

EAGLEVIEW Technologies

Property Risk Management Report

123 Main St, Anytown, WA 98xxx <Date>

REPORT IMAGES

Report #: 5635553
Geocode: 40.2119742,
93.8694994

The following aerial images show different angles of this structure for your reference. Additional images may have been used in the creation of this report and not included in this final document.

380

Area View

PAGE 2

Fig. 24

732

EAGLEVIEW Technologies

Property Risk Management Report

123 Main St., Anytown, WA 98xxx <Date>

REPORT IMAGES

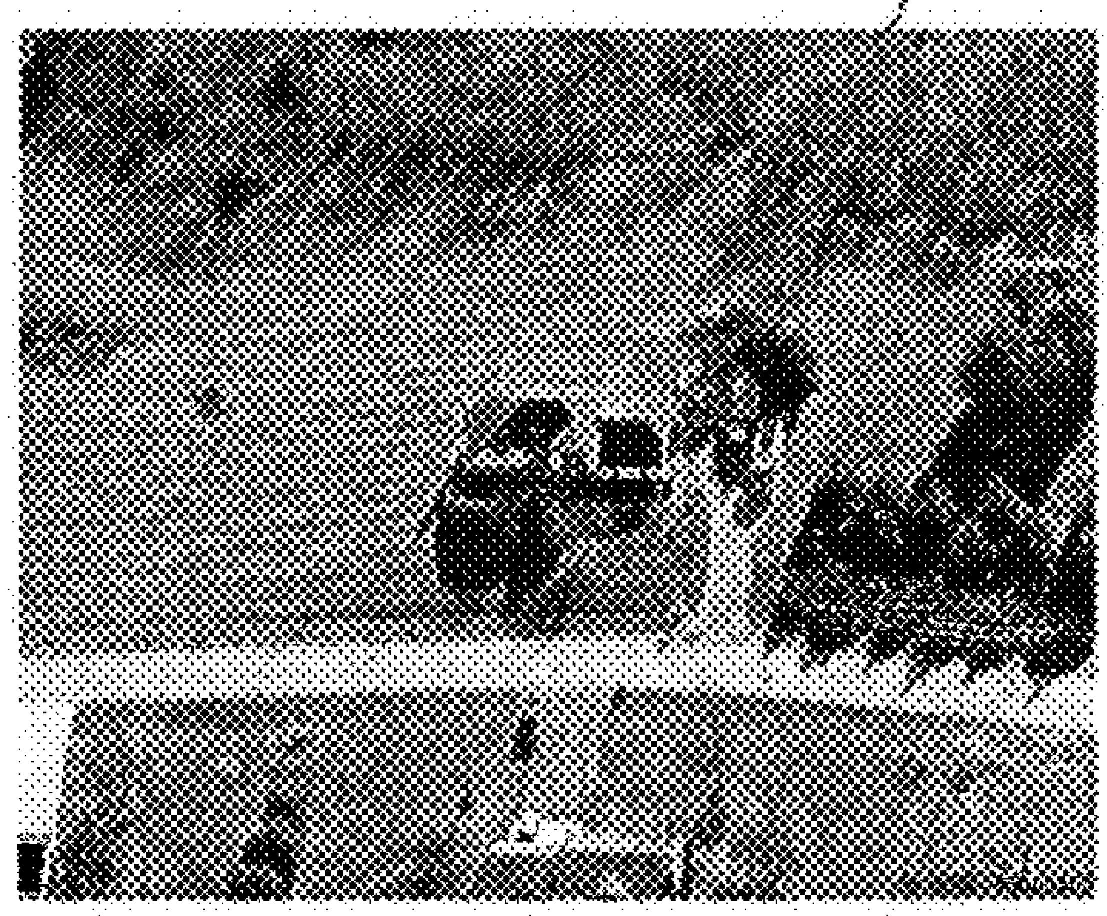
Report #: 5635553
Geocode: 40.2119742, 93.8694984

The following aerial images show different angles of this structure for your reference. Additional images may have been used in the creation of this report and not included in this final document.

382

North View

384



South View

PAGE 3

Fig. 25

734

EAGLEVIEW Technologies

Property Risk Management Report

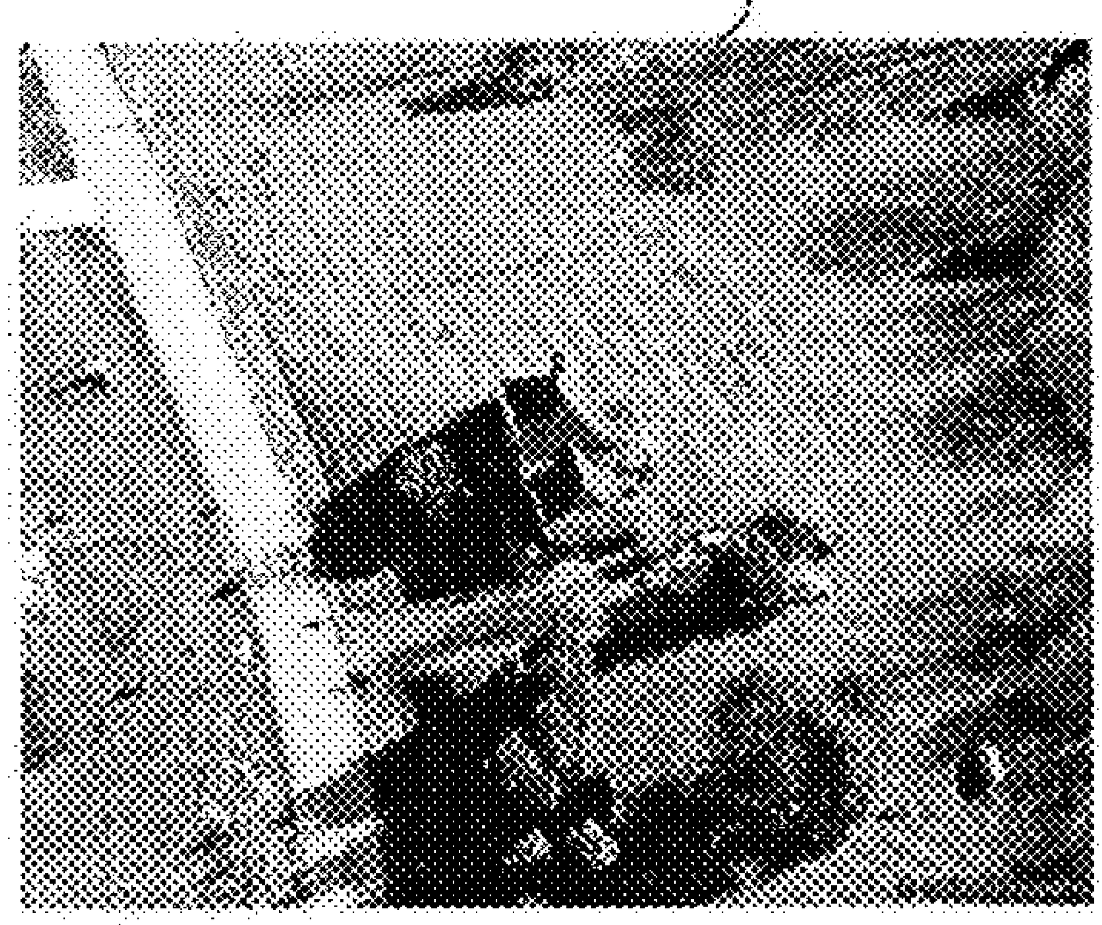
123 Main St., Anytown, WA 98xxx <Date>

REPORT IMAGES

Report #: 5635553
Geocode: 40.2119742, 93.8694994

The following aerial images show different angles of this structure for your reference. Additional images may have been used in the creation of this report and not included in this final document.

386



East View

388

West View

PAGE 4

Fig. 26

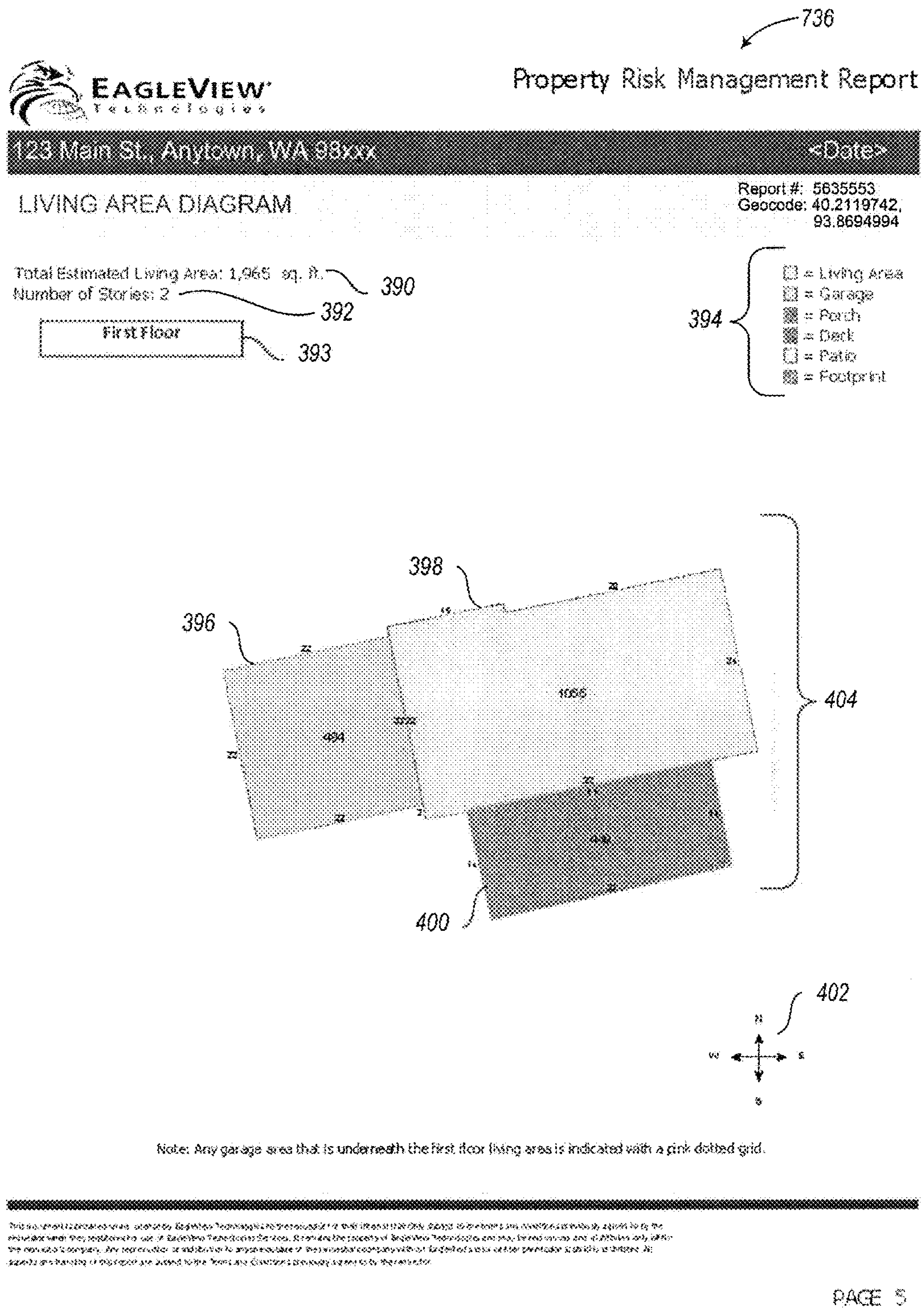

736
EAGLEVIEW
Technologies
Property Risk Management Report
123 Main St., Anytown, WA 98xxx
<Date>
LIVING AREA DIAGRAM
Report #: 5635553
Geocode: 40.2119742,
93.8694994
Total Estimated Living Area: 1,965 sq. ft.
390
Number of Stories: 2
392
First Floor
393
394
= Living Area
= Garage
= Porch
= Deck
= Patio
= Footprint
398
396
404
1066
400
402
N
W
E
S
Note: Any garage area that is underneath the first floor living area is indicated with a pink dotted grid.
PAGE 5

Fig. 27

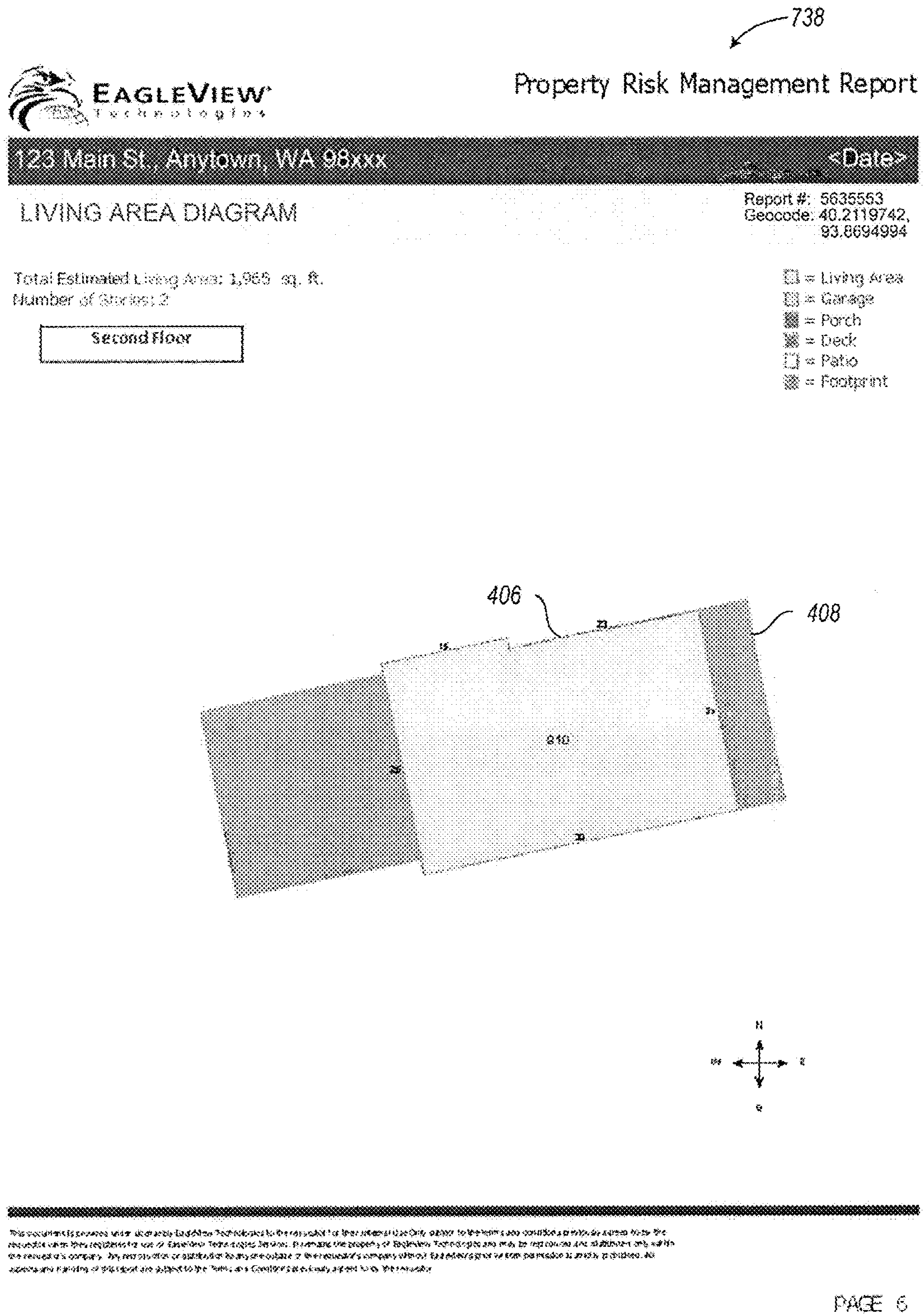

738
EAGLEVIEW Technologies
Property Risk Management Report
123 Main St., Anytown, WA 98xxx
<Date>
LIVING AREA DIAGRAM
Report #: 5635553
Geocode: 40.2119742, 93.8694994
Total Estimated Living Area: 1,965 sq. ft.
Number of Stories: 2
Second Floor
= Living Area
= Garage
= Porch
= Deck
= Patio
= Footprint
406
408
810
N
E
PAGE 6

Fig. 28

740

EAGLEVIEW Technologies

Property Risk Management Report

123 Main St., Anytown, WA 98xxx <Date>

STRUCTURAL & PROPERTY OBSERVATIONS

Report #: 5635553
Geocode: 40.2119742, 93.8694994

CONFIDENCE RATING: ■ ■ ■ ■ 410

4 – Very High: Straightforward construction, often single story, easily-defined garage, quality images.
3 – High: Potential for minor discrepancies, like vaulted ceilings on two stories home, or minor tree coverage.
2 – Medium: Very complex construction with multiple stories often combined with poor or incomplete image sets.
1 – Low: Very poor or incomplete images.

412

413

STRUCTURAL OBSERVATIONS

Year Built:	1983
Number of Stories:	2
Number of Family Structure:	Single Family
Structure Footprint:	1,539 sq. ft.
Corners:	6
Estimated Total Living Area:	1,965 sq. ft.
Garage Area:	484 sq. ft.
Garage Type:	Attached
Deck Area:	449 sq. ft.
Patio Area:	0 sq. ft.
Porch Area:	0 sq. ft.
Estimated Roof Pitch:	6-9
Roof Shape:	Hip/Gable
Number of Chimneys:	1
Outbuilding Count:	0
Outbuilding Total Area:	0 sq. ft.
Basement Area:	1,012 sq. ft.
Finished Basement Area:	1,012 sq. ft.
Basement Type:	Full
Basement Description:	Finished

*For more information, please see our **Glossary of Terms**.*

PROPERTY OBSERVATIONS

Building Permit:	No
EagleView Roof Report:	No
EagleView Wall Report:	No
Dist. to Commercial Exposure:	436 ft.
Distance to Steep Slope:	117 ft.
Distance to Water Hazard:	0 ft.
Distance to Vegetation:	161 ft.
Type of Vegetation:	Tree
Cross-Sell Identification:	Motorcycles
Slope on Property:	No
Trampoline:	No
Swimming Pool/Hot Tub:	No
Responding Fire Station:	Leavenworth County Fire Department District 1 Station 1
Responding Fire Station Type:	Combination
Responding Fire Station Dist.:	4-5 Miles
Owner Occupied:	N/A

PAGE 7

Fig. 29

SYSTEMS AND METHODS FOR PERFORMING A RISK MANAGEMENT ASSESSMENT OF A PROPERTY

BACKGROUND

Technical Field

This invention is in the field of building size estimation, and in particular, building floor area estimation.

Description of the Related Art

Building floor area is used throughout the construction, real estate, insurance and finance industries. For example, the square footage measurement of a building is used as a main factor in quickly determining the market value of real estate, estimating costs of materials to repair or replace flooring and make other improvements or modifications to the entire building. Thus, accurate floor area measurements are instrumental in these calculations. Current methods of measuring floor area often involve a person having to visit the building and manually measure particular dimensions within the building, or by referring to original plans or blueprints of the building. Manually measuring the dimensions for verification of building floor area is costly and original plans for the building may be unavailable or out of date. Therefore, accurate methods for estimating and verifying floor area, and for using such floor area estimation and verification in the construction, real estate, insurance and finance industries, which avoid these drawbacks are desirable.

SUMMARY OF THE INVENTION

A subset of building floor area, referred to as total living area (TLA) is used by insurance underwriters (Underwriters) as one component of assessing whether to insure a property, what kind of insurance to provide and at what premium rate. Underwriters also factor in overall condition of the property to be insured which includes, among other things, a visual assessment of the number of buildings such as detached garages and barns on the property; building features such as roofs, chimneys, siding, skylights, windows and doors; items on the property such as recreational vehicles, abandoned cars, and animal pens; and distances from the property to features such as steep ground slopes, water hazards, greenbelt areas, and fire hydrants. In addition, Underwriters may also factor in data from government records pertaining to the property and buildings on it. Current methods of acquiring this information often involve a person having to visit the property and manually measure and inspect the property, or having to visit a location to view original plans or blueprints of the building. Manually measuring total living area (TLA) and manually evaluating property condition is costly, particularly given the high demand for underwriting new policies or reassessing old policies. Therefore accurate methods for estimating TLA and evaluating property conditions that avoid these drawbacks are desirable.

In one embodiment, a floor area measurement system receives a first and a second aerial image of the building, each of the aerial images providing a different view of the roof of the building. The system correlates the first aerial image with the second aerial image to generate a three-dimensional model of the roof that includes a plurality of planar roof sections that each have a corresponding slope, area, and edges. An adjusted roof model is generated by adjusting a slope of the planar roof sections in the three dimensional model of the roof to substantially zero. This may be performed in a variety of manners, including, in one embodiment, removing particular roof features from the model that would not be present in a flat roof, namely a roof with zero slope. For example, one step is to remove ridge lines or other features distinguishing individual planar roof sections resulting in a virtual fusing of the individual roof sections in the model into one flat roof. This may be performed instead of or in addition to adjusting a slope parameter or variable of each roof section within the roof model to zero. In other embodiments, this step may be performed with just one initial aerial image of the building showing a substantially orthogonal view of the building since roof pitch need not be determined and can be assumed to be zero.

The system generates the estimated floor area measurement of the building based on the calculated estimated total roof area of the roof after the roof model has been adjusted. This is based on a correlation between the size of the building roof and the size of the building. Typically, the floor area of a single full floor of the building is roughly the size of the roof of the building if the roof were assumed to be flat, namely a slope of zero. This will turn the roof into another floor in the virtual space. With additional adjustments to the roof area measurements to account for multiple floors, roof overhang, wall width, internal building features such as walls and staircases, and/or obstructed views of the building in the aerial image(s), etc., an even more accurate floor area estimation is generated.

In one embodiment, a floor area measurement estimation system may be a system integrated with a roof estimation system or other system that provides roof measurements. In other embodiments, the roof area measurements may be provided by an external source, system or entity, or may be input manually by an operator of the floor area measurement estimation system. Various received roof measurements may often correspond closely to external dimensions of the building such as the width and length of the building and/or lengths of exterior walls or sections of exterior walls of the building. In another embodiment, the output of the floor area measurement may take the form of an electronic or printed report that includes, but is not limited to geocoding information of the property, images of the property from one or more views, diagrams showing the area and dimensions of living area on different floors.

One embodiment is a computing system for generating an estimated floor area measurement, the computing system comprising: a memory; a floor area measurement estimation module that is stored on the memory and that is configured, when executed, to: receive one or more aerial images of a roof of a building including a substantially top-down image of the roof; and generate, based at least in part on the received aerial images, an estimated floor area measurement of the building.

One embodiment is a computer-implemented method for generating an estimated floor area measurement, the method comprising: receiving one or more aerial images of a roof of a building including a substantially top-down image of the roof; using the substantially top-down image of the roof to calculate an estimated total roof area of the roof assuming each section of the roof has no slope; and generating the estimated floor area measurement of the building based on the calculated estimate total roof area of the roof.

One embodiment is a computer-readable medium whose contents enable a computing system to generate an estimated floor area measurement, by performing a method comprising: receiving one or more aerial images of a roof of a building including a substantially top-down image; using the substantially top-down image to calculate an estimated total roof area of the roof assuming each section of the roof has no slope; using the one or more aerial images of the roof to determine the number of floors of the building that are under the roof; and generating, based at least in part on the estimated total roof area measurement and the number of floors that are under the roof, an estimated floor area measurement of the building.

One embodiment is a computing system for generating a risk management report, the computer system comprising: a memory; a risk management report module that is stored on the memory and that is configured, when executed, to: receive features and conditions data about a property; receive risk management criteria for the property; and generate, based at least in part on the received features and conditions data and risk management criteria, a risk management report for the property.

One embodiment is a computer-implemented method for generating a risk management report, the method comprising: receiving features and conditions data about a property; receiving risk management criteria for the property; and generating, based at least in part on the received features and conditions data and risk management criteria, a risk management report for the property.

One embodiment is a computer-readable medium whose contents enable a computing system to generate an estimated floor area measurement, by performing a method comprising: receiving features and conditions data about a property; receiving risk management criteria for the property; and generating, based at least in part on the received features and conditions data and risk management criteria, a risk management report for the property.

One embodiment is a computing system for generating a risk management report, the computing system comprising: a memory; a risk management report module that is stored on the memory and that is configured, when executed, to: receive features and conditions data about a property; receive risk management criteria for the property; receive one or more aerial images of a roof of a building on the property including a substantially top-down image of the roof; generate, based at least in part on the received aerial images, an estimated floor area measurement of the building; and generate, based at least in part on the received features and conditions data, estimated floor area measurement of the building and risk management criteria, a risk management report for the property.

One embodiment is a computer-implemented method for generating a risk management report, the method comprising: receiving features and conditions data about a property; receiving risk management criteria for the property; receiving one or more aerial images of a roof of a building on the property including a substantially top-down image; using the substantially top-down image of the roof to calculate an estimated total roof area of the roof assuming each section of the roof has no slope; using the one or more aerial images of the roof to determine the number of floors of the building that are under the roof; generating, based at least in part on the estimated total roof area measurement and the number of floors that are under the roof, an estimated floor area measurement of the building; and generating, based at least in part on the received features and conditions data, estimated floor area measurement of the building and risk management criteria, a risk management report for the property.

A computer-readable medium whose contents enable a computing system to generate an estimated floor area measurement, by performing a method comprising: receiving features and conditions data about a property; receiving risk management criteria for the property; receiving one or more aerial images of a roof of a building on the property including a substantially top-down image; using the substantially top-down image of the roof to calculate an estimated total roof area of the roof assuming each section of the roof has no slope; using the one or more aerial images of the roof to determine the number of floors of the building that are under the roof; and generating, based at least in part on the received features and conditions data, estimated floor area measurement of the building and risk management criteria, a risk management report for the property.

In another embodiment, the output of the floor area measurement may take the form of an electronic or printed report that includes, but is not limited to geocoding information of the property, images of the property from one or more views, diagrams showing the area and dimensions of living area on different floors, number of stories.

The output of the overall property condition evaluation includes structural observations such as type of structure, corners, estimated roof pitch, roof shape, structure footprint, basement area and basement type; and property observations, such as whether there is building permit, roof or wall report available, distances to commercial exposures or natural hazards, and/or other property observations.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

The patent or application file contains at least one drawing executed in color. Copies of this patent or patent application publication with color drawing(s) will be provided by the Office upon request and payment of the necessary fee.

FIG. **1**A is a flow diagram showing an example method of generating an estimated floor area measurement, according to one non-limiting illustrated embodiment.

FIG. **1**B is a flow diagram showing a method that may be included as part of the generating floor area measurement step of the method shown in FIG. **1**A, according to one non-limiting illustrated embodiment.

FIG. **1**C is a flow diagram showing a method that may be included as part of the generating total roof area step of the method shown in FIG. **1**B, according to one non-limiting illustrated embodiment.

FIG. **1**D is a flow diagram showing an example method of generating a risk management report and determining insurance product offers, which in some instances may use the floor area measurements or methods for generating the floor area measurements described herein, according to one non-limiting illustrated embodiment.

FIG. **1**E is a flow diagram showing a method that may be included as a part of the receive risk management criteria step of the method shown in FIG. **1**D, according to one non-limiting illustrated embodiment.

FIG. **1**F is a flow diagram showing a method that may be included as a part of the receive additional data from one or more sources step of the method shown in FIG. **1**D, according to one non-limiting illustrated embodiment.

FIG. **1**G is a flow diagram showing a method that may be included as a part of the evaluate the aerial views and received additional data in light of the risk management criteria step of the method shown in FIG. **1**D, according to one non-limiting illustrated embodiment.

FIG. **1**H is a flow diagram showing a method that may be included as a part of the provide additions, updates, and/or corrections to the data step of the method shown in FIG. **1**D, according to one non-limiting illustrated embodiment.

FIG. **1**I is a flow diagram showing a method that may be included as a part of the receive underwriting criteria step of the method shown in FIG. **1**D, according to one non-limiting illustrated embodiment.

FIG. **2** is an example screenshot of a user interface of a system for generating floor area measurements, which may be used independently of, as part of, or integrated with the systems and methods for generating a risk management report described herein, showing roof sections annotated on an aerial image of the roof, according to one non-limiting illustrated embodiment.

FIG. **3** is an example screenshot of a user interface of the system of FIG. **2** for generating floor area measurements with area measurements of roof sections annotated on an aerial image of the roof, according to one non-limiting illustrated embodiment.

FIG. **4** is an example screenshot of a user interface of the system of FIG. **2** for generating floor area measurements showing the roof annotated with an estimated total roof area on which to base an estimated floor area measurement, such as that estimated in the method of FIGS. **1A-1**C, according to one non-limiting illustrated embodiment.

FIG. **5** is an example screenshot of a user interface of the system of FIG. **2** for generating floor area measurements showing the building annotated with an adjusted estimated floor area measurement, such as that estimated in the method of FIGS. **1A-1**C, according to one non-limiting illustrated embodiment.

FIG. **6** is an example screenshot of a user interface of the system of FIG. **2** for generating floor area measurements showing the building annotated with adjusted estimated first and second floor area measurements, such as that estimated in the method of FIGS. **1A-1**C, according to one non-limiting illustrated embodiment.

FIG. **7** is an example screenshot of a user interface of the system of FIG. **2** for generating floor area measurements showing a line drawing of a top plan view of each the first and second floor of the building annotated with corresponding floor area measurements, such as that estimated in the method of FIGS. **1A-1**C, according to one non-limiting illustrated embodiment.

FIG. **8** is an example screenshot of a user interface of the system of FIG. **2** for generating floor area measurements showing a line drawing of a top perspective view of the first and second floor of the building annotated with corresponding floor area measurements, such as that estimated in the method of FIGS. **1A-1**C, according to one non-limiting illustrated embodiment.

FIG. **9** is a schematic diagram of a computing environment in which systems and methods for estimation of building floor area and generating a risk management report may be implemented or of which they may be a part.

FIG. **10** is an example screenshot of a user interface of a system for generating floor area measurements which may be used independently of, as part of, or integrated with the systems and methods for generating a risk management report described herein, showing roof sections annotated on an aerial image of the roof, according to one non-limiting illustrated embodiment.

FIG. **11** is an example screenshot of a user interface of the system of FIG. **10** for generating floor area measurements showing an aerial view used to identify floors and the roof section areas, dimensions, and levels annotated on which to base an estimated floor area measurement or a risk management report, such as that estimated in the method of FIGS. **1A-1**I, according to one non-limiting illustrated embodiment.

FIG. **12** is an example screenshot of a user interface of the system of FIG. **10** for generating floor area measurements showing an aerial view used to identify floors and the roof section areas, dimensions, and levels annotated on which to base an estimated floor area measurement or a risk management report, such as that estimated in the methods of FIGS. **1A-1**I, according to one non-limiting illustrated embodiment.

FIG. **13** is an example screenshot of a user interface of the system of FIG. **10** for generating floor area measurements showing an aerial view used to identify floors and the roof section areas, dimensions, and levels annotated on which to base an estimated floor area measurement or a risk management report, such as that estimated in the methods of FIGS. **1A-1**I, according to one non-limiting illustrated embodiment.

FIG. **14** is an example screenshot of a user interface of the system of FIG. **10** for generating floor area measurements showing an aerial view used to identify floors and the roof section areas, dimensions, and levels annotated on which to base an estimated floor area measurement or a risk management report, such as that estimated in the methods of FIGS. **1A-1**I, according to one non-limiting illustrated embodiment.

FIG. **15** is an example screenshot of a user interface of the system of FIG. **10** for generating floor area measurements showing an aerial view used to identify floors and the roof section areas, dimensions, and levels annotated on which to base an estimated floor area measurement or a risk management report, such as that estimated in the method of FIGS. **1A-1**I, according to one non-limiting illustrated embodiment.

FIG. **16** is an example screenshot of a user interface of a system for gathering property risk assessment data using one or more aerial images of the property, which may be used independently of, as part of, or integrated with the systems and methods for generating a risk management report described herein, according to one non-limiting illustrated embodiment.

FIG. **17** is an example screenshot of a user interface of the system of FIG. **16** for gathering property risk assessment data, such as that described in the method of FIGS. **1A-1**I, according to one non-limiting illustrated embodiment.

FIG. **18** is an example screenshot of a user interface of the system of FIG. **16** for gathering property assessment data, using measurement tools to estimate distance, such as that described in the method of FIGS. **1A-1**I, according to one non-limiting illustrated embodiment.

FIG. **19** is an example screenshot of a user interface of the system of FIG. **16** for gathering property risk assessment data, showing data entered from other sources, such as that described in the method of FIGS. **1A-1**I, according to one non-limiting illustrated embodiment.

FIG. **20** is an example screenshot of a user interface of the system of FIG. **16** for gathering property risk assessment data, including roof characteristics, such as that estimated in the method of FIGS. **1A-1**I, according to one non-limiting illustrated embodiment.

FIG. **21** is an example screenshot of a user interface of the system of FIG. **16** for gathering property risk assessment data including property ground characteristics, such as that described in the method of FIGS. **1A-1**I, according to one non-limiting illustrated embodiment.

FIG. **22** is an example page of a report that provides floor area and property assessment data, such as that estimated in the method of FIGS. **1A-1**I, according to one non-limiting illustrated embodiment.

FIG. **23** is an example page of a report to provide floor area and property risk assessment data, including report details and building summary, such as that estimated in the method of FIGS. **1**A-**1**I, according to one non-limiting illustrated embodiment.

FIG. **24** is an example page of a report to provide floor area and property risk assessment data, including report images, such as that described in the method of FIGS. **1**A-**1**I, according to one non-limiting illustrated embodiment.

FIG. **25** is an example page of a report to provide floor area and property risk assessment data, including multiple aerial angles of the property, such as that described in the method of FIGS. **1**A-**1**I, according to one non-limiting illustrated embodiment.

FIG. **26** is an example page of a report to provide floor area and property risk assessment data, including multiple aerial angle images, such as that described in the method of FIGS. **1**A-**1**I, according to one non-limiting illustrated embodiment.

FIG. **27** is an example page of a report to provide floor area and property risk assessment data, including the dimensions and the area for different sections of a floor of a building, such as that estimated in the method of FIGS. **1**A-**1**I, according to one non-limiting illustrated embodiment.

FIG. **28** is an example page of a report to provide floor area and property risk assessment data, including dimensions and area by sections for a particular floor of a building, such as that estimated in the method of FIGS. **1**A-**1**F, according to one non-limiting illustrated embodiment.

FIG. **29** is an example page of a report to provide floor area and property assessment data, including structural observations, property observations, and confidence rating of the floor area and property assessment data, such as that described in the method of FIGS. **1**A-**1**I, according to one non-limiting illustrated embodiment.

DETAILED DESCRIPTION

FIG. **1**A is a flow diagram showing an example method **100** of generating an estimated floor area measurement, according to one non-limiting illustrated embodiment.

While each of the steps shown in FIG. **1**A contributes to the overall solution, each can be used independently or in various combinations to yield improvements in estimating floor area measurements as discussed below. Below is an overview of each step in the process, which will be followed by a more detailed discussion of each step.

At **102**, the process receives roof measurements of a building having a roof. These measurements may be estimated or actual dimensional and/or area measurements of the roof such as one or more of: roof edge lengths, ridge lengths, gable lengths, hip lengths, valley lengths, roof section pitch, roof area measurements, planar roof section area measurements, planar roof section dimension measurements, etc. These roof measurements may be generated internally by a component of a system that estimates floor area measurements (i.e., a floor area measurement estimation system) and received from such an internal component, or may be generated and received from an external component or entity separate from the floor area measurement estimation system. In some embodiments, the external component is located remotely from the floor area measurement estimation system.

For example, in some embodiments, the floor area measurement estimation system may be a system integrated with a roof estimation system or other system that provides roof measurements. In other embodiments, the roof area measurements may be provided by an external source, system or entity, or may be input manually by an operator of the floor area measurement estimation system. Various received roof measurements may often correspond closely to external dimensions of the building such as the width and length of the building and/or lengths of exterior walls or sections of exterior walls of the building.

At **104**, the process generates, based at least in part on the received roof measurements, an estimated floor area measurement of the building. For example, the received roof measurements may include roof edge measurements of the roof. In such an embodiment, a floor area measurement estimation module of the floor area measurement estimation system is configured to generate, based at least in part on the received roof measurements, an estimated floor area measurement. In some embodiments, the received roof measurements may include roof area measurements. In some embodiments, the floor area measurement estimation module of the floor area measurement estimation system is configured to generate, based at least in part on the received roof area measurements, an estimated floor area measurement. For example, the roof measurements may be generated by the roof estimation system described in U.S. Pat. No. 8,078,436 issued Dec. 13, 2011, and entitled AERIAL ROOF ESTIMATION SYSTEMS AND METHODS, U.S. Pat. No. 8,209,152 issued Jun. 26, 2012, and entitled CONCURRENT DISPLAY SYSTEMS AND METHODS FOR AERIAL ROOF ESTIMATION, which are each incorporated herein by reference in their entireties and such a roof estimation system may be integrated with the floor area measurement estimation system, or various components of the floor area measurement estimation system described herein. Also, features of embodiments described herein may be combined with one or more other features of estimating measurements of structures, including those systems and methods described in U.S. patent application Ser. No. 13/757,694, filed Feb. 1, 2013 entitled SYSTEMS AND METHODS FOR ESTIMATION OF BUILDING WALL AREA which is incorporated herein by reference in its entirety.

In many such embodiments, one or more of the roof measurements are based on aerial photographs of the building via manual or automated analysis of roof features, such as by using the roof estimation system or modules described in one or more of U.S. patent application Ser. No. 12/148,439 filed on Apr. 17, 2008 and entitled AERIAL ROOF ESTIMATION SYSTEM AND METHOD, U.S. Pat. No. 8,078,436 issued Dec. 13, 2011, and entitled AERIAL ROOF ESTIMATION SYSTEMS AND METHODS, U.S. patent application Ser. No. 12/467,244 filed May 15, 2009 and entitled PITCH DETERMINATION SYSTEMS AND METHODS FOR AERIAL ROOF ESTIMATION, U.S. patent application Ser. No. 12/467,250 filed May 15, 2009 and entitled CONCURRENT DISPLAY SYSTEMS AND METHODS FOR AERIAL ROOF ESTIMATION, U.S. patent application Ser. No. 13/019,228 filed Feb. 1, 2011 and entitled GEOMETRIC CORRECTION OF ROUGH WIREFRAME MODELS DERIVED FROM PHOTOGRAPHS and U.S. Provisional Patent Application Ser. No. 61/594,956 filed Feb. 3, 2012 and entitled SYSTEMS AND METHODS FOR ESTIMATION OF BUILDING WALL AREA. In some alternative embodiments, such measurements may be made by an operator or an automated system actually or virtually outlining, drawing and/or otherwise detecting the perimeter of the roof on, or based on, an aerial image of the roof to indicate an initial estimated floor shape or foot print, and providing such data as input used by the system for estimating floor area described herein which would otherwise use the roof edge measurements from a two or three dimensional model of the roof. For example, such outlining or drawing the perimeter on the roof may be performed within a graphical user interface displaying the image of the roof such as that shown in FIGS. **10-15** below. Thus, utilizing some embodiments described herein, one may estimate floor area measurements of a building merely using one or more aerial photographs of the building, with little or no additional information initially needed.

FIG. **1**B is a flow diagram showing a method **110** that may be included as part of the generating floor area measurement step of the method shown in FIG. **1**A, according to one non-limiting illustrated embodiment.

While each of the steps shown in FIG. **1**B contributes to the overall solution, each can be used independently or in various combinations to yield improvements in estimating floor area measurements as discussed below.

At **112**, the process generates roof edge measurements based on initial roof edge measurements included in the received roof measurements, assuming each section of the roof has no slope regardless of an actual slope of each section of the roof. For example, if the two edges of the gable of a pitched roof are 20 feet and the gable has a pitch angle of 90 degrees, then instead of two edges of 20 feet, the process generates a single roof edge of sqrt(800)~28.3 feet. The process generates roof edge measurements as if the entire roof was flat.

At **114**, the process uses the roof edge measurements to calculate an estimated total roof area of the roof assuming each section of the roof has no slope. Thus, the process generates roof area measurements as if the entire roof was flat.

In embodiments in which a roof estimation system is integrated with the floor area measurement system, the floor area measurement system first receives a first and a second aerial image of the building, each of the aerial images providing a different view of the roof of the building. The system correlates the first aerial image with the second aerial image to generate a three-dimensional model of the roof that includes a plurality of planar roof sections that each have a corresponding slope, area, and edges. In this embodiment, an adjusted roof model is generated by adjusting a slope of the planar roof sections in the three dimensional model of the roof to substantially zero. This may be performed in a variety of manners, including, for example, removing particular roof features from the model that would not be present in a roof with a slope of zero. The planar roof sections in the model become one large flat roof section. For example, the system will remove ridge lines, valleys or other features distinguishing individual planar roof sections. This creates the effect of having fused all roof sections together which can be termed as fusing them in a virtual software computer sense. This may be also performed instead of or in addition to by just adjusting a slope parameter or variable of each roof section within the roof model to zero. In other embodiments, this step may be performed with just one initial aerial image of the building showing a substantially orthogonal view of the building since roof pitch need not be determined and can be assumed to be zero.

At **116**, the process generates the estimated floor area measurement based on the calculated estimated total roof area of the roof. This is based on a correlation between the size of the building roof and the size of the building. Typically, the floor area of a single full floor of the building is roughly the size of the roof of the building if the roof were flat with no slope (i.e., virtually turning the roof into another floor). With additional adjustments to the roof area measurements described below (e.g., with respect to FIG. **1**C) to account for multiple floors, roof overhang, wall width, internal building features such as walls and staircases, and/or obstructed views of the building in the aerial image (s), etc., an even more accurate floor area estimation is generated.

In other embodiments, the received roof measurements may instead or additionally include at least one of: a plurality of dimensional measurements of a two-dimensional outline of the roof from a top plan view of the roof and an area of the two-dimensional outline of the roof from the top plan view of the roof. In such instances, the dimensions of the two-dimensional outline of the roof from a top plan view of the roof may be used as the roof edge measurements on which to base the estimated floor area. However, these dimensional measurements of a two-dimensional outline of the roof need not be referred to as "roof edge measurements" or "roof measurements" to fall within the scope of the embodiments described herein.

FIG. **1**C is a flow diagram showing a method **120** that may be included as part of the generating total roof area step of the method shown in FIG. **1**B, according to one non-limiting illustrated embodiment. While each of the steps shown in FIG. **1**C contributes to the overall solution, each can be used independently or in various combinations to yield improvements in estimating floor area measurements as discussed herein.

At **122**, the process subtracts an amount from one or more of the roof edge measurements corresponding to an estimated roof overhang over one or more walls of the building to obtain adjusted roof edge measurements. For example, each roof edge measurement may be reduced by 6 inches to 18 inches corresponding to an estimated roof overhang, which is selectable by a user of the floor area measurement estimation system. This can be considered to be eroding the length in a virtual sense by some amount. However, any variety of other lengths or ranges of lengths may be used including, for example a zero length or those of standard or typical roof overhang lengths.

At **124** the process subtracts an amount from one or more of the adjusted roof edge measurements corresponding to an estimated wall width to obtain adjusted roof edge measurements. For example, each roof edge measurement may be reduced by 6 inches to 18 inches corresponding to an estimated wall width, which is selectable by a user of the floor area measurement estimation system. However, other lengths or ranges of lengths may be used (e.g., those of standard or typical wall widths).

At **126** the process receives information regarding floor area spaces of the building that are not to be included in the estimated floor area measurement of the building. For example, these areas may be areas of the building that are not used for living inside the building or areas outside the building including, but not limited to: garages; attics; unfinished rooms above the garage or other locations; covered balconies; patios, decks or porches, unfinished basements; crawl spaces; etc. This information may be received from an external system, source or entity; input by a user (e.g., identified or marked by a user on an image or drawing of the building displayed within a graphical user interface of the system); and/or identified by the system via analysis of an image of the building. In some embodiments, adjustments to exclude areas not to be included in the living area calculation may be made by reducing the total area of the building by a certain percentage factor. This reduction would estimate non-living area taken up by interior walls, stairs, and other similar features. This percentage factor reduction may be based on statistical analysis of buildings with similar design, historical measurements of the building, or partial measurements of the building. The percentage factor reduction may also be estimated by the building owner, occupier, or contractor.

At **128** the process generates an initial estimated floor area measurement based on an area corresponding to an extent to which the spaces that are not to be included in the estimated floor area measurement extend under the roof and based on the adjusted roof edge measurements. For example, the roof edge measurements may be used to calculate an estimated roof area with assumed slope of zero. Then, areas corresponding to an extent to which such spaces extend under the roof may be subtracted from the estimated roof area. This also may be performed in response to a user marking or otherwise identifying such areas on an image or drawing of the building displayed within a graphical user interface of the system. In some embodiments, the entire process of generating an initial estimated floor area is automated by the system recognizing these particular features in one or more images of the building through image analysis that utilizes typical characteristics of such features as viewed from the various angles of those in the one or more images of the building.

At **130**, the process generates the estimated floor area measurement based on information received regarding a number of stories or floors of the building. For example, the floor area measurement estimation system may receive information regarding how many stories the building has and regarding one or more sections of the roof below which one or more of the stories extends. The system may then generate the estimated floor area measurement based on a total area of the one or more sections of the roof under which each of the stories extends and based on the generated estimated total roof area of the roof. This total area of the one or more sections of the roof under which each of the stories extends may be calculated using the adjusted roof edge measurements and then adjusted according to various other features of the building indentified in the an image of the building or otherwise received by the system. These various other features of the building indicate one or more sections of the roof below which one or more of the stories extends. Such features identify split level homes, homes with lofts, vaulted ceilings, etc.

In some embodiments, the system may be used to identify the footprint area based on identifying points at the level of the ground around the base of the building. This may be done by using one or more aerial images to select the points at various intervals where the ground meets the structure of the building, for example where the ground comes into contact with the foundation of the building. This method may be used to produce a polygon that is determined by the base of the building. In other embodiments, the points identified at the base of the building may be used to create a three-dimensional model of the building at the ground level, and use this model to estimate the buildings footprint area at ground level. Once this is done, a user may then use different oblique aerial images to determine the number of floors in the building, and therefore determine an accurate area estimate of the building. In some embodiments, this process of creating a three-dimensional building model at ground level, and/or determining the footprint area of the building may be automated using visual analysis or graphics analysis techniques applied to the aerial images.

The system may determine how many stories the building has using a second aerial image of the building representing a view from a different angle than the substantially orthogonal view of the top of the building such that the building height and other features related to how many stories the building has may at least be partially seen. This determination may be performed in response to a user inputting a value representing the number of stories or by the user marking or otherwise identifying such areas corresponding to the different stories on an image or drawing of the building displayed within the graphical user interface of the system. A number of different techniques may be used to identify the stories in a building. For example, a user may looking for eave lines to identify a ceiling of a story, or identifying features such as windows, decks, toward dormers that indicate a floor. In addition, the user may assume a standard room height for each story, for example 8 feet, and working either from the top of the building down, or starting at the base of the building and working up estimate the number of stories. Using multiple techniques may result in a more accurate story estimate.

The shape and perimeter of each building story may be annotated on a drawing or image of the building displayed in the graphical user interface and manipulated by a user of the system collectively and/or individually to make the adjustments described herein. The adjustments will indicate one or more sections of the roof below which one or more of the stories laterally extends. The estimated total floor area of the building is then calculated by adding the areas of each identified floor together to get the total area. The resulting changes in estimated total floor area are generated by the floor area estimation system and displayed on the drawing or image of the building displayed in the graphical user interface.

In some embodiments, the entire process of generating an initial estimated floor area is automated by the system recognizing these particular building features (e.g., building stories, floors, etc.) in one or more images of the building through image analysis that utilizes typical characteristics of such features as viewed from the various angles of those in the one or more images.

Examples of using the estimated floor area of a structure (e.g., a building) and/or the processes and systems to generate estimated floor area described herein include using such estimated floor area, processes and/or systems as part of generating estimates for and/or data for generating estimates or assessments regarding insurance coverage for the structure or real estate including the structure, property risk assessment, and/or construction and repair of the structure. For example these estimates and/or assessments include, but not limited to, estimates and/or assessments regarding: the overall value of a structure; the overall value of real estate including the structure; cost of replacing or repairing the structure; insurance rates or premiums for insuring the structure; determining, predicting and/or calculating costs of replacing or repairing the structure pursuant to processing or paying insurance claims regarding the structure; processing insurance claims regarding the structure; managing risk with respect to the structure becoming or being damaged and/or risk with respect to insuring and/or paying existing or potential insurance claims on the structure; etc.

For example, FIG. **1**D is a flow diagram showing method **135** of generating a risk management report, which in some instances may use the floor area measurements or methods for generating the floor area measurements described herein, according to one non-limiting illustrated embodiment.

While each of the steps shown in FIG. 1D contributes to the overall solution, each can be used independently or in various combinations to also yield improvements in producing a risk management report as discussed below. Below is an overview of each step in the process, which will be followed by a more detailed discussion of each step.

At **135***a*, the process receives risk management criteria from an entity, wherein the risk management criteria are used to create a risk management profile of a particular property. For example, an insurance company may have risk management criteria that it uses to evaluate a property to create a risk management profile of the property. This permits an insurance company to manage the risk with respect to the structure on the property or other features of the property becoming or being damaged and/or risk with respect to insuring and/or paying existing or potential insurance claims on the property. This profile can be used, for example, to determine which insurance products and at what premiums it will offer the owner. The risk management criteria may include but is not limited to conditions of aspects of buildings on the property, density and size of vegetation on the property, property terrain features such as steepness of slope or water features, and nearness to commercial areas or fire stations.

At **135***c*, the process receives one or more aerial views of the property and surrounding area. In some embodiments, these aerial views may include top-down, substantially orthogonal views, or oblique views showing the property and buildings at an angle. In some embodiments these aerial views may be used to evaluate the features and conditions of the property.

In some instances, the resolution of these aerial views, or other images taken of the property, is detailed enough to allow visual analysis of specific features such that a user viewing the image, or a computer based process of analyzing the image, can determine conditions that previously could only be discovered through an on-site visit to the property. For example, differences in shading on a roof may indicate excessive or uneven weathering of the roof that may require earlier repair. Another example is to view the cupping of shingles or evidence of missing shingles that indicate a repair is needed. Differences in the texture roof may also indicate a recent repair or patch that has been done, or that loss or other debris is collecting on the roof. This information will allow a user, for example, to determine whether a roof has not been properly maintained, or is near the end of its life more accurately from these images, resulting in fewer on-site property visits.

These higher resolution images may be acquired from a number of sources, including enhanced satellite images, enhanced images acquired from airplane over-flights, or images acquired from drones.

In addition, multiple images of the property captured at multiple times may also be used to assess condition. For example, a 2002 picture of a garage roof that shows damage may be compared with a 2007 picture of the same roof that shows a tree landed on the same spot as the previous damage. This information would be useful in determining the amount of loss attributable only to the tree damage.

At **135***e*, the process receives additional data from one or more sources. These sources may include, but are not limited to, insurance companies, government entities, contractors, and the like. The sources may also include systems that have generated roof estimations, wall estimations, or floor estimations.

At **135***g*, the process evaluates the received aerial views and received additional data using the risk management criteria to determine the risk management profile of the property. In some embodiments, this evaluation involves a human operator viewing the aerial images and the additional data to answer questions about the property that correspond to risk management criteria used to assess the risk management profile of the property. In this instance, the human operator is in the role of an evaluator who is providing additional information about the property value and the risks involved by viewing one or more aerial images of the property. In other embodiments, these questions may also be asked to property owners, property occupants, and to owners or occupants of surrounding properties. These questions may also be asked to related or concerned parties with respect to the property, for example police, public utility workers, maintenance workers, lenders, previous owners, and the like.

There may be commonly used questions associated with certain risk management criteria that all insurance companies will want answered. For example, these questions may include age of the property, total living area, distance to a fire hydrant, and the like. There will also be questions unique to an individual insurance company that may, for example, use enhanced actuarial models for the property it ensures. In addition, there will be questions asked that are based on the geographic region or location of the property. For example, these questions may include detailed information on the construction and securing of a building roof in areas known for tornadoes, or detailed questions on drainage systems for buildings in areas known for heavy rain or flooding.

In other embodiments, this evaluation involves graphical image processing, data management, and/or statistical methods to answer the questions. For example, where high-resolution imagery described above may not be available for a property, statistical methods applied lower-resolution imagery may be preferable to incurring the cost to send a person on-site. One example of this method includes analyzing multiple lower-resolution images of the same facet of the building taken at the same time but at different angles for texturing differences that may reveal more information than either image would alone.

Statistical methods may be used on images captured outside the visible spectrum. For example, using ultraviolet images of a building may reveal how worn a roof is depending on the roof's ultraviolet reflective properties. Similarly, statistical analysis on infrared images may be used to detect water damage, or areas of a roof with higher water content in the materials based on different rates of absorption of infrared by water. Also, infrared images may be used to create heat-loss profiles for a neighborhood, allowing comparisons among the buildings that may indicate the beginning of a roof failure.

Other statistical methods may be used to understand the condition of a property include the age of the home, the age of the neighborhood, whether the home is used as a rental, and other factors to estimate property condition. At **135***i*, the process generates a risk management profile report for the property based on the evaluation completed in the previous step.

At **135***k*, the process stores the risk management profile information. In some embodiments, this information is stored along with profiles of other properties to be used for various purposes such as property risk history.

At **135***m*, the process distributes the risk management profile report. In some embodiments, the report is sent to the insurance company, the insurance agent, the property owner, or other entity that uses the risk profile to make decisions concerning the property.

At **135***o*, the process provides additions, updates, and/or corrections to the data received. In some embodiments, the evaluation process which uses property data from many sources may uncover errors or other problems which the source of the data may wish to know about and correct. For example, a building's total living area as determined by an operator using current aerial views may not match the total living area documented in county tax records. In one embodiment, the process will allow data that is collected and verified for a risk management profile to be shared with a government agency. In this way the government agency, for example the county in which the property resides, can maintain current records for the property data it uses for its operations. For example, whether the current building area is correct, whether there is a change in the use of land which may be indicated by clearing a forest, erecting outbuildings, paving the lot, and the like. The county may wish to update their records in order to determine a fair tax valuation for the property, or adjust services to the property such as waste disposal. In some embodiments, discrepancies discovered in data that exceed a tolerance threshold may generate an automatic notification to the government. In another embodiment, the data may be directly updated by the process by sending the data directly to government databases, either county or state.

In other embodiments, this data may be shared directly with one or more insurance companies, either by notifying the company that their data is out of date, or by directly updating the insurance company's database. The insurance company will use changes in the data to determine whether changes in features and conditions of the property are significant enough to require reevaluation of other insurance products associated with the property,

At **135***q*, the process receives underwriting criteria from insurance companies that describes the insurance products and premium amounts the company offers based on the features and risk management profile of a property. In one embodiment, the criteria determines the features or combination of features on the property that will cause it to the insurable, and provides the formulas that use the conditions of features on the property to determine insurance premium cost.

The risk management profile of the property is determined by combining the results of the questions asked, the data analyzed and the statistical methods used. If the risk management profile can be determined remotely with a high degree of accuracy, it may not be necessary to incur the cost of sending an agent or inspector for an on-site property visit.

The principle determiner for the premium amount charged for an insurance policy on a structure is the structure's replacement cost. If the estimate of replacement cost is based on inaccurate data, the customer may not be offered sufficient coverage for the structure. In result of a total loss, the insurance payments will not be sufficient to rebuild the structure, which will result in a highly dissatisfied customer. On the other hand, the customer will be dissatisfied if replacement cost is overestimated, resulting in higher premiums than the customer could have paid. At **135***r*, the process determines the insurance products to offer and the pricing of the products for the property. In one embodiment, certain features and conditions of the property will be associated with certain insurance products. For example, if a residential property also has one or more commercial buildings on it, than a commercial insurance product may be appropriate. In another example, if the residential property has an RV parked in the yard, offering an auto insurance product that covers the RV may be appropriate. In another embodiment, criteria involving conditions of features on the property may determine the premium amounts offered for a particular policy. For example, if the condition of the roof of a residential building appears excessively worn or damaged, the premiums for ensuring that building will be higher than if the roof was not damaged.

FIG. **1**E is a flow diagram showing an example method **140** of receiving risk management criteria used to create a risk management profile of a property step of the method shown in FIG. **1**D, according to one non-limiting illustrated embodiment. While each of the steps shown in FIG. **1**E contributes to the overall solution, each can be used independently or in various combinations to yield improvements in receiving risk management criteria from an entity as discussed below.

At **140***a*, the process receives risk management criteria from an entity used to create a risk management profile of a property. In one embodiment, the criteria are used to evaluate features of the property to create a risk management profile of the property. Features of the property may include but are not limited to buildings, vegetation, terrain, distance to water, distance to commercial areas, and distance to a fire station. Features of a building may include but are not limited to year built, number of stories, style of roof, floor area, and number of windows. In addition, the criteria may also describe various conditions of the features of a property. In one or more embodiments, the criteria may be received as a data file that may be imported into an evaluation system.

At **140***c*, the process stores the risk management criteria received from each company. In one embodiment, the criteria from each company are stored in a database and used during the evaluation process, described below, when the property risk assessment profile is being created.

At **140***e*, the process determines the criteria elements that are common among companies. In one embodiment, elements are reviewed by an operator to determine the common elements. In another embodiment elements are compared electronically.

At **140***g*, the process uses the common criteria elements to allow risk management profile evaluation comparison among companies. In one embodiment, this allows the evaluation process, described below, to efficiently produce risk management profile reports for a number of insurance companies.

FIG. **1**F is a flow diagram showing an example method **150** of receiving additional data from one or more sources to used to determine a risk management profile step of the method shown in FIG. **1**D, according to one non-limiting illustrated embodiment. While each of the steps shown in FIG. **1**F contributes to the overall solution, each can be used independently or in various combinations to yield improvements in receiving additional data from one or more sources as discussed below.

At **150***a*, the process receives one or more aerial views of the property. In one or more embodiments, these aerial views may include a top-down, or substantially orthogonal view of the property, and/or oblique views of the property taken at angles from different directions. For example, an oblique aerial view of the property may be taken at a 45° angle from the north, and another taken at a 50° angle from the west. In one embodiment, these aerial views are provided in a digital format.

At **150***c*, the process receives floorplan estimates and total living area estimates for buildings on the property. In one embodiment, these estimates are received from the roof estimation system or a floor area measurement system described herein. In another embodiment the estimates may come from county records.

At **150***e*, the process receives data generated from modeling or estimation software for buildings. In one or more embodiments, this data may be generated by a roof estimation systems, wall estimation systems, 3D modeling systems, CAD systems, or the like.

At **150***g*, the process receives data on file for similar houses in the community. In one or more embodiments, this data may include the date the neighborhood was developed, the average age of houses, typical improvements done to property, and the like.

At **150***i*, the process receives government records on the property. In one or more embodiments, these records may include but are not limited to information received from county or city building departments, which include building plans, building permit information, as-built information and the like. The records may also include government tax records that include estimated total living area of buildings on the property. One embodiment therefore provides for the aggregating of city and county property records, deeds, tax assessments, with insurance company information, together with a series of photographic images of the home taken at distinct times from a plane or satellite.

At **150**K, the process receives data from contractor or construction firms. In one or more embodiments, this may include but is not limited to blueprints, as-built information, landscape elevations, and repair information.

At **150***m*, the process receives data from scans of the property. In one or more embodiments, these scans may include but are not limited to infrared scans, thermal imaging scans, and the like.

At **150***o*, the process receives property data collected on-site. In one or more embodiments, this data includes but is not limited to visual information on property features, for example external and internal property features of buildings. Examples of external features are the condition of walls, roofs, chimneys, skylights, porches, patio, decks, garages, and other exterior features. Example of internal features are the conditions of walls, ceilings, floors, carpeting, windows, fixtures, skylights, and other interior features.

Conditions of other property features may include but are not limited to terrain, vegetation, water hazards, trampolines, hot tubs, swimming pools, outbuildings, automobiles, or other outside features relevant to determine a risk management profile. Of particular interest will be above ground swimming pools. In some instances, these may hold a great deal of water, for example a pool of about 4'-5' high and 12'-15' in diameter holds many thousands of gallons. Such a pool not only increases the risk of personal injury to those who live on and visit a property, but also increase the risk of flood damage to the home owner and close neighbors. The photographic images will show, for example, if a home owner has placed a large above ground pool very close to his home or immediately adjacent his property line and close to a neighbor's home. If, at some later time, the pool were to leak or burst, such a placement may cause significant property damage to the owner's home by flooding basement, washing out a foundation or the like. It may also present a risk to a neighbor's home for the same reason. This is just one example of risk management factors that could be taken into account by an insurance carrier in setting a premium or deciding whether to agree to insure the property.

In some embodiments, this visual information may be captured using an image or video recording device by the property owner or one or more other individuals evaluating the property. In some embodiments, the data collected may include but is not limited to interviews with property owners, tenants, or one or more neighbors.

In other embodiments, data collected may include data from chemical samples, odor detectors, radiation detectors, radon detectors, moisture detectors, RFI detectors and the like.

In one or more embodiments, additional data required during the evaluation process, described below, may be requested from one or more individuals who are evaluating the property.

At **150***q*, the process receives data collected from insurance companies. In one or more embodiments, this data may include but is not limited to existing photographs of the property, descriptions and measurements of features on the property, insurance claims history of the property and the like. In addition this data may include insurance data available for buildings or property near the property being evaluated. A preferred source of data are aerial images taken by planes and satellites at distinct time intervals over a period of time.

FIG. **1**G is a flow diagram showing a method **155** that may be included as a part of the evaluate the aerial views and received data in light of risk management criteria step of the method shown in FIG. **1**D, according to one non-limiting illustrated embodiment. While each of the steps shown in FIG. **1**G contributes to the overall solution, each can be used independently or in various combinations to yield improvements in evaluating the aerial views and received data as discussed below.

At **155***a*, the process generates questions for assessing the individual elements of the risk management criteria for the property. In one embodiment, a question is created for each criteria element. For example, if an element is the age of a building, a generated question may be "what year was the building built?" If an element is an above ground pool, this could be asked, if the answer is yes, then more questions can be generated about its location, size and other issues.

At **155***c*, the process uses the aerial views and received data to provide answers to the generated questions. In one or more embodiments, the answers to the questions may be but are not limited to being provided by an operator at a workstation viewing the images and the data, an automated system analyzing the aerial views and received data, and one or more individuals viewing the aerial views and receive data according to a crowd sourcing model.

At **155***e*, the process receives questions to answer. In one non-limiting embodiment, an individual at a workstation is viewing the aerial images and the received data. However, in some embodiments, this process may be automated.

At **155***g*, the process evaluates data and aerial images to answer the received questions. In this embodiment, an operator at a workstation is viewing the aerial images, the received data and the received questions, and is answering the questions based on the operator's evaluation of the images and data.

At **155***i*, the process provides a confidence rating for answers to the questions. In one embodiment, the operator enters a confidence rating for each individual question answered. In another embodiment, the operator enters an overall confidence rating once all questions are answered.

At **155***k*, the process receives questions to answer. In one non-limiting embodiment, the aerial images and received data are analyzed by an automated system to determine the answers.

At **155***m*, the process uses graphical processing to analyze received aerial views to identify features of the property. In one non-limiting embodiment, a feature of the property may be a building, terrain, water feature, vegetation, or other characteristic of the property relevant to a risk management assessment.

At **155***n*, the process uses visual recognition, graphical analysis, and the like to identify features and conditions of the property to determine answers to the questions. For example, to identify roof wear or prior patch made to the roof by analyzing the pattern or color differences identified on the roof or to identify the condition of the skylight or window by using optical density analysis. In another example, to use visual analysis to determine the distance to the nearest water feature or to determine the style of a building, or to identify if a trampoline or swimming pool is located on the property.

At **155***o*, the process uses graphical processing to compare similar aerial views of the property taken at different times to determine answers to the questions. Examples include but are not limited to identifying the rate of deterioration of an outbuilding roof, the rate of growth of vegetation, whether any structures have been newly built or modified, whether damage to a structure has been sustained but unrepaired over time such as hailstorm damage, and the like.

At **155***p*, the process uses data processing to analyze data about neighboring properties to estimate answers to the questions. Examples include but are not limited to the age of surrounding buildings, the age of the neighborhood, the condition of surrounding property, and the like.

At **155***q*, the process uses statistical techniques to determine the confidence rating for answers to the questions. These techniques include but are not limited to analyzing the resolution of aerial views, any obstruction by trees of views to the buildings, age of data received indicating it may be out of date, and the like.

At **155***r*, the process receives questions to answer. In one non-limiting embodiment, the evaluation is performed using a crowd sourcing model, in which, for example a number of individuals view the aerial views and additional data, and answer the questions. The questions the evaluators would be asked will give significant information that affect the valuation of the property, the risk of loss and cost to replace certain structures. The evaluator may be asked to consider such as issues as the upkeep of the yard, whether they are one or more abandoned vehicles on the property, the presence of any pets, such as dogs or cats and other issues that may drastically affect the property value. In one embodiment, the evaluators would be provided access to images of the property over a range of time.

In one embodiment, the evaluator they would able to view current pictures of the property, pictures from 2-3 years prior, then 4-5 years prior, then 6-8 years prior, etc. The evaluators who are part of the crowd sourcing would be able to view the property modifications over time to inform them of the quality of their evaluations. For example, the evaluator would be able to obtain data regarding when the current owner bought the property, which would be supplied from the system that obtained the data from county and state property ownership records. The evaluator would then request images having dates from prior to the current owner and then after the current owner. The evaluator would review whether the condition of the property had improved significantly under the current owner or deteriorated under the current owner. For example, the evaluator might notice that a new fence has been built and that the yard is being well maintained. He may also notice a number of other features which indicate that the owner has kept the property in good condition and improved it significantly. He might also notice that a new tool shed has been built and other improvements made that are not reported on the county or state property records. He may notice that new siding was recently added and new storm proof, double pane windows installed. These would be significant factors to increase the quality of the property and its value, many of which would not be reported, or even obtainable by other methods.

The evaluator may be asked to look for such factors as the installation of burglar alarms, security lights, a sidewalk installed by the city, the addition of city lights near the home, and other factors will affect the risk of a claim on the property which would not show up on normal property report.

Similarly, the reviewer may notice that shortly after the current owner bought the property that a dog house was added in the back yard. He may also notice that the yard is being torn up, with because it is not maintained or a pet is destroying some of the landscape. In addition, the evaluator may be asked to look for the addition of a swimming pool. Recently, above ground pools have become quite popular and are often added, but these are not reported on property records of building permits, yet they present a significant increase in the risk of death or serious injury to a child. The evaluator will be able to look at pictures spaced every few years to compare the changes in the state of the property. This will give the evaluator addition data and information to make an informed evaluation about the current state of the home and whether it is improving or decreasing.

One series of questions the evaluator might be asked will directed to determining the honesty of the property owner regarding reports about his own property, which will be significant benefit to the insurance company that is doing the risk assessment. For example, the evaluator may obtain property specific data that has been supplied by the property owner that states whether a pool is present on the property, if a new fence has been built, if there is a security system that has been recently installed, if there are abandoned vehicles on the property and the like. The evaluator will then be asked the same questions about the property for which the owner has provided information. If the owner reported that there was no pool on the property and pictures show that shortly after he bought the property, he installed a pool and it has been there for few years, this will provide information about the integrity of the owner. Similar data can be checked to determine whether the photographs of the property match statements the owner has made about the property, which can used to evaluate the risk to the insurance company.

By the technique of viewing images of the property that span multiple years, the evaluator will be given questions to answer that will provide insights as to the risk to an insurance company to insure the property and also the true value of the property. Some factors, such as installing new windows, a new fence, new siding and maintaining the yard will indicate that the risk of certain types of claims is low and therefore the insurance company can better evaluate the premium to be charged and the value of the home. Other factors will indicate that the current occupant is a high risk or that the property is not well maintained and thus the insurance company may increase the premium. At **155***s*, the process identifies the evaluators that will receive the questions, the additional data, and aerial images, referred to an evaluator information packet. In one or more embodiments the evaluators may be but are not limited to the general public, volunteers, paid contractors, the property owner, property tenants, neighbors of the property, and the like.

At **155**t, the process sends the questions, data, and aerial images to the evaluators. In one or more non-limiting embodiments, this may be done electronically via email, a Smartphone application, on paper, or the like.

At **155**u, the process evaluates the data and aerial images to answer the questions. In one or more non-limiting embodiments, this may be done by an individual operator at a workstation, by an automated process, using crowd sourcing, or by a combination of each.

In a preferred embodiment for crowd sourcing, the process sends the evaluator information packet to the evaluators along with a deadline date for completing the property evaluation. Other people, master reviewers would review and evaluate the evaluators work, and make comments on the original evaluation, along with comments on the evaluators. These comments would be made public, which in one or more embodiments may refer to the pool of evaluators, a group of people interested in the result of the evaluation, the public at large, or some other group. The original evaluation and the assessment of the evaluation by the master reviewers would then be reviewed to determine whether the evaluation should be accepted as is or if the original evaluation should be modified. The master reviewer would be able to edit the evaluation by the evaluators. He would also have data to be able to determine whether the evaluator has an unacceptable bias and thus his comments should be edited or eliminated. Some of the basis by which the master reviewer would be able to evaluate the quality of the evaluators report are described below.

Once completed, after the master reviewer has completed his review and modification of the work of the evaluators and the crowd sourcing, the evaluation could be made public or provided on a private basis to insurance companies. In some embodiments, a master reviewer does not modify or even view the report and this step is omitted, but it is preferred in most embodiments.

In one embodiment, the property information provided to the evaluators should not contain any geographically identifiable information or other information that may be used to identify the individuals living in the building being evaluated. Thus, the evaluation is done unbiased since the evaluator can view details about the property, but does not know its physical location.

In one alternative, evaluators would be in the same geographic area as the property they are evaluating. According to one embodiment, the third party might, in some cases be selected based on living close to the same address as the property to be evaluated. The evaluation therefore might be done by a neighbor who lives across the street, on the same block or in the same general area. While such evaluations have data to be more accurate, there is significant risk of bias, either favorable or unfavorable to the property owner. Whether the evaluator had personal knowledge of the property on the owner being evaluated will be data that is given to the master reviewer. He will therefore take this into account whether to weight the evaluators report with a high confidence rating or a low confidence rating or ignore it completely.

At **155**v, the process provides a confidence rating for answers to the questions. In one or more embodiments, the operator may enter either a confidence rating for each individual question answered, or an overall confidence rating once all questions are answered. Or, if using an automated process, statistical techniques may be used to determine the confidence rating.

At **155**w, the process receives the answers from the evaluators. In one or more non-limiting embodiments, this may be done electronically, via email, a Smartphone application, on paper, or the like.

At **155**x, the process assesses the accuracy of each evaluator for use in selecting future evaluators. In one or more embodiments, the assessment may take the form of, but not limited to, several techniques. In one non-limiting example, statistical techniques may be used to generate the most likely correct answer for each question answered by the evaluator and compare that answer to the evaluator's answer. In another non-limiting example, individuals may review the evaluations done by each evaluator and vote on the accuracy of the each evaluation.

FIG. **1**H is a flow diagram showing a method **160** that may be included as part of providing additions, updates, and/or corrections to the data received step of the method shown in FIG. **1**D, according to one non-limiting illustrated embodiment. While each of the steps shown in FIG. **1**H contributes to the overall solution, each can be used independently or in various combinations to yield improvements in providing additions, updates, and/or corrections to the data received as discussed below.

At **160**c, the process identifies data that has been found during the evaluation process to be incorrect. In one or more embodiments, examples of this data include but are not limited to images that are out of date, area estimates of buildings that are incorrect, number of listed outbuildings that is not correct, and the like. In one or more embodiments, the term "correct" may include a deviation within a certain tolerance level.

At **160**e, the process reports to the source of the data that the data is not correct. In one or more embodiments, this may include but is not limited to notifying the source of the data (e.g. an insurance company) that the data is not correct, sending the source the correct data, updating the source with the correct data, and the like.

FIG. **1**I is a flow diagram showing a method **165** that may be included as part of the receiving underwriting criteria for insurance product offers and pricing for the property step of the method shown in FIG. **1**D, according to one non-limiting illustrated embodiment. While each of the steps shown in FIG. **1**I contributes to the overall solution, each can be used independently or in various combinations to yield improvements in estimating floor area measurements as discussed below.

At **165**a, the process receives underwriting criteria to determine the insurance products and premiums available based on a property's risk assessment profile. Examples of this underwriting criteria include but are not limited to a list of the features of a property that corresponds to a particular insurance products offered by the company and the various conditions of the features of the property that affect premium cost of each insurance product.

At **165**c, the process receives the property risk management profile. In one non-limiting embodiment, the property risk management profile is retrieved from a database containing property risk management profiles.

At **165**e, the process determines the insurance products and pricing for the property. In one non-limiting embodiment, the process compares the features and conditions of the property found in the property risk management profile to the received underwriting criteria to determine what insurance products are available for the property and the premium cost of each insurance product.

At **165**g, the process determines if the confidence rating for the property risk management profile is high enough to not send a person to the property for an on-site inspection. In one non-limiting embodiment, the confidence rating that is part of the properties risk management profile is compared with other factors including but not limited to the features of the property, the condition of the features of the property, the dollar cost of the insurance products being quoted, cost to send someone for an on-site inspection, and the like. A company may, based on the comparison, either choose to not send a person on-site and instead make the decision to issue the policy based solely on the analysis of remotely-gathered information in a process known as "desk underwriting" insurance products.

FIG. **2** is an example screenshot of a user interface of a system for generating floor area measurements with roof sections annotated on an aerial image of the roof, according to one non-limiting illustrated embodiment. For example, the screenshots of FIGS. **2-8** are screenshots of the graphical user interface of the floor area measurement system which performs the processes described in FIGS. **1**A-**1**C above.

Shown is a graphical user interface including two panels, one with an image of a building showing a top substantially orthogonal view **202** of the building and the other with an image of the building showing a top oblique view **204** of the same building. Also shown is an annotation **212**, which is a line drawing of a three dimensional model of the roof. The annotation **212** is an adjustable graphical user interface element overlaid on the roof of the building in each image corresponding to the angle of view **202** and view **204** of the roof in each image. The annotation **212** also shows various planar sections of the roof as delineated by the roof features and roof lines, such as the ridge line, valley lines and roof eaves, etc. This annotation **212** is an interactive graphical user interface feature and may be manipulated by a user of the system to make various adjustments to roof features and characteristics for the purpose of generating roof measurements, such as those used in the processes shown in FIGS. **1**A-**1**C and other embodiment described herein. These may be performed by user interaction with the annotation itself and/or various selectable controls **206**.

Also shown are image selection bars **208** and **210** which display thumbnail or reduced-size images of various other images showing the building from other perspectives and view angles. Selection bar **208** is located above view **202**. When a particular thumbnail image in selection bar **208** is selected, the image showing the current view **202** is replaced with that of the selected image. Similarly, selection bar **210** is located above view **204**. When a particular thumbnail image in selection bar **210** is selected, the image showing the current view **204** is replaced with that of the selected image.

FIG. **3** is an example screenshot **300** of a user interface of the system of FIG. **2** for generating floor area measurements with area measurements **302**, **304** and **306** of roof sections annotated on an aerial image of the roof, according to one non-limiting illustrated embodiment. For example, when the user selects the "next button" **214** shown in FIG. **2**, the floor area measurement estimation system calculates the areas **302**, **304** and **306** of each roof section according to the roof annotation **212**, as adjusted by the user, and displays these area values **302**, **304** and **306** on the corresponding sections of the roof in the displayed image. Also shown is a "Fuse" button **308**, the selection of which causes results to be displayed as shown in FIG. **4**.

FIG. **4** is an example screenshot **400** of a user interface of the system of FIG. **2** for generating floor area measurements showing the roof annotated with an estimated total roof area **402** on which to base an estimated floor area measurement, such as that estimated in the method of FIGS. **1**A-**1**C, according to one non-limiting illustrated embodiment. For example, when the user selects the "Fuse" button **308** shown in FIG. **3**, the floor area measurement estimation system may perform the acts **112** and **114** of the process shown in FIG. **1**B to calculate an estimated total roof area of the roof by setting each section of the roof to a zero slope.

In this embodiment, the floor area measurement estimation system generates an adjusted roof model by adjusting the slope to substantially zero of the planar roof sections having areas **302**, **304** and **306** shown in FIG. **3** in the three dimensional model of the roof represented by annotation **212**. This may be performed in a variety of manners, including, for example, by removing particular roof features from the model represented by annotation **212** in FIG. **3** that would not be present in a flat roof with no slope. This could be considered "fusing" individual planar roof sections in the model into one flat roof section, such as by removing ridge lines or other features distinguishing individual planar roof sections instead of, or in addition to, adjusting a slope parameter or variable within the model to zero. This process results in the adjusted annotation **212** displayed by the system as shown in FIG. **4** without lines indicating roof features such as ridge lines associated the pitched roof. Thus, the system generates and provides roof edge measurements using the roof model as if the entire roof was flat with no slope, as shown by the annotation **212** representing the roof model in FIG. **4**.

Although the screenshot of the graphical user interface **300** shows both the orthogonal view **202** and oblique view **204**, in other embodiments, this action may be performed with just one initial aerial image of the building using and/or showing only the substantially orthogonal view **202** of the building since roof pitch need not be determined and can be assumed to be zero.

Also shown is an "Erode" button **402**, the selection of which causes results to be displayed as shown in FIG. **5**, as will be explained in conjunction with FIG. **5** below.

FIG. **5** is an example screenshot **500** of a user interface of the system of FIG. **2** for generating floor area measurements showing the building annotated with an adjusted estimated floor area measurement, such as that estimated in the method of FIGS. **1**A-**1**C, according to one non-limiting illustrated embodiment. For example, when the user selects the "Erode" button **402** shown in FIG. **4**, the floor area measurement estimation system will perform the acts **122** and **124** of the process shown in FIG. **1**C to calculate an adjusted estimated total roof area of the roof by subtracting an amount from each section of the roof to account for an eave overhang distance.

In this embodiment, the floor area measurement estimation system subtracts an amount from one or more of the roof edge measurements in the roof model represented by annotation **212** corresponding to an estimated roof overhang over one or more walls of the building to obtain adjusted roof edge measurements. For example, each roof edge measurement may be reduced (i.e., "eroded") by 6 inches to 18 inches corresponding to an estimated roof overhang, which is selectable by a user of the floor area measurement estimation system. However, other lengths or ranges of lengths may be used.

The floor area measurement estimation system may also subtract an amount from one or more of the adjusted roof edge measurements in the roof model represented by annotation **212** corresponding to an estimated wall width to obtain adjusted roof edge measurements. For example, each roof edge measurement may be reduced (i.e., "eroded") by 6 inches to 18 inches corresponding to an estimated wall width, which is selectable by a user of the floor area measurement estimation system. However, other lengths or ranges of lengths may be used.

The amount of length subtracted from a line to obtain a more accurate measure of the internal footprint of the home will vary depending on the factor being subtracted for. If the factor being subtracted for is an eave, the value may be 2 feet, 3 feet, or another selected amount which may be a default value, such as 2 feet, or a value selected by an operator from seeing a second image of the home, which provides an oblique view of the overhang difference, which in some homes might be 4 feet. On the other hand, if the subtraction is for a wall thickness, the amount will usually be 6 inches or at most 10 inches. For a porch or deck, the amount might be 10 feet, 12 feet or some other value, based on an estimate of the true distance from an operator viewing one or more oblique images.

In some embodiments, each time a user selects the "erode" button **402**, an additional adjustment shortening the lengths of the roof edges will be performed by the system. Note that the annotation **212** in FIG. **5** is now adjusted corresponding to the adjusted roof edge lengths such that the actual edges of the roof in the image shown in both the orthogonal view **202** and oblique view **204** extend beyond the borders of the annotation **212**. The corresponding roof area measurement **502** is also therefore adjusted accordingly by the floor area measurement estimation system (e.g., from 2144 square feet down to 1855 square feet as shown in FIGS. **4** and **5**, respectively).

FIG. **6** is an example screenshot **600** of a user interface of the system of FIG. **2** for generating floor area measurements showing the building annotated with adjusted estimated first floor and second floor area measurements, such as that estimated in the method of FIGS. **1A**-**1C**, according to one non-limiting illustrated embodiment. For example, the user may manipulate or otherwise adjust the annotation **212**, or add additional annotations to represent multiple floors of the building as identified in the oblique view **204** of the building. Based on these adjustments, the floor area measurement estimation system may perform act **130** of the process shown in FIG. **1C** to generate the estimated floor area measurement based on information received regarding a number of stories of the building. For example, the floor area measurement estimation system may receive information regarding how many stories the building has and regarding one or more sections of the roof below which one or more of the stories laterally extends. The system may then generate the estimated floor area measurement based on a total area of the one or more sections of the roof under which each of the stories extends and based on the generated estimated total roof area of the roof.

In the example embodiment shown in FIG. **6**, shown is a first floor annotation **602** and a second floor annotation **604** that combined form annotation **212**. The relationship between the first floor, second floor and roof can be seen form a different perspective in the oblique view **204** as the second floor annotation **604** shows that the second floor laterally extends substantially the entire length of the roof. However, the first floor annotation **602** shows that the first floor laterally extends about half way the length of the roof and the second floor due to the garage. The first floor annotation **602** and a second floor annotation **604** may be directly or indirectly manipulated and adjusted resulting in different area measurements of the floor represented by these annotations.

Also, first floor annotation **602** and second floor annotation **604** may be directly or indirectly manipulated and adjusted to account for spaces that are not to be included in the estimated floor area measurement. For example, these areas may be areas of the building that are not used for living inside the building or areas outside the building, including but not limited to: garages; attics; unfinished rooms above the garage or other unfinished spaces; covered balconies; patios, decks or porches, basements; crawl spaces; etc. This also may be performed in response to a user marking or otherwise identifying such areas on the first floor annotation **602** and second floor annotation **604**, or otherwise adjusting the dimensions of the sides of the first floor annotation **602** and second floor annotation **604** to "notch" out or "cut" out such areas. In some embodiments, selectable graphical user interface items are provided representing such spaces. When selected an placed on the first floor annotation **602** and second floor annotation **604**, a an area corresponding to a standard size and/or shape of such a space will be removed from the first floor annotation **602** and second floor annotation **604**, and the floor area measurements will be adjusted accordingly.

For example, a selectable graphical user interface item representing a standard two-car garage may be selected by a user and placed in a position on the first floor annotation **604** overlaid on the image of the building corresponding to where a garage of the building is located. The floor area measurement estimation system will then subtract an area corresponding to the area of the standard two-car garage from the area of the first floor according to the position of the graphical user interface item representing the standard two-car garage on the first floor annotation **604**.

FIG. **7** is an example screenshot **700** of a user interface of the system of FIG. **2** for generating floor area measurements showing a line drawing of a top plan view of each the first and second floor of the building annotated with corresponding floor area measurements of the building shown in FIG. **6**, such as that estimated in the method of FIGS. **1A**-**1C**, according to one non-limiting illustrated embodiment. The line drawing represents the first floor annotation **602** and the second floor annotation **604** shown in FIG. **6**. Note that the corresponding estimated floor areas are displayed on each annotation. These are adjusted by the floor area measurement estimation system upon manipulation of the corresponding first floor annotation **602** or second floor annotation **604** by the user.

FIG. **8** is an example screenshot **800** of a user interface of the system of FIG. **2** for generating floor area measurements showing a line drawing of a top perspective view of the first and second floor of the building shown in FIG. **6** annotated with corresponding floor area measurements, such as that estimated in the method of FIGS. **1A**-**1C**, according to one non-limiting illustrated embodiment. Shown in this manner in the graphical user interface of the floor area measurement estimation system, a user may manipulate the corresponding first floor annotation **602** and/or second floor annotation **604** and see the visual effects of the changes according to the positional relationships between the first and second floors corresponding to the oblique view **204** shown in FIG. **6**.

Provided the example in FIG. **8**, the total estimated floor area of the building is 2866 square feet (1076 square feet as noted on the first floor annotation **602** plus 1790 square feet as noted on the second floor annotation **604**). Various reports may be generated showing the estimated areas of the various floors and/or the estimated total floor area of the building. For example, a report may be generated by the building floor area measurement estimation system or by using the data provided by the building floor area measurement estimation system that includes diagrams similar to the screenshots **700** and **800** shown in FIGS. **7** and **8**, respectively either alone or overlaid on the corresponding images of the building shown in FIG. **6**.

FIG. **9** is a schematic diagram of a computing environment in which systems and methods for estimation of building floor area may be implemented or of which they may be a part. For example, processes **100**, **110** and **120** described above in conjunction with FIGS. **1A-1C** may be performed or implemented by, for example, one or more software modules or components or any combination of suitable hardware, firmware or software components or devices including those that are a part of, stored in, or configure the computing environment of FIG. **9**. Also, the graphical user interface functions and features may be performed or implemented by, for example, one or more software modules or components or any combination of suitable hardware, firmware or software components or devices including those that are a part of, stored in, or configure the computing environment of FIG. **9**.

The computing environment **900** will at times be referred to in the singular herein, but this is not intended to limit the embodiments to a single device since in typical embodiments there may be more than one computer system or device involved. Unless described otherwise, the construction and operation of the various blocks shown in FIG. **9** are of conventional design. As a result, such blocks need not be described in further detail herein, as they will be understood by those skilled in the relevant art.

The computing environment **900** may include one or more processing units **912***a*, **912***b* (collectively **912**), a system memory **914** and a system bus **916** that couples various system components including the system memory **914** to the processing units **912**. The processing units **912** may be any logic processing unit, such as one or more central processing units (CPUs) **912***a*, digital signal processors (DSPs) **912***b*, digital video or audio processing units such as coder-decoders (codecs) or compression-decompression units, application-specific integrated circuits (ASICs), field programmable gate arrays (FPGAs), etc. The system bus **916** can employ any known bus structures or architectures, including a memory bus with memory controller, a peripheral bus, and a local bus. The system memory **914** includes read-only memory ("ROM") **918** and random access memory ("RAM") **920**. A basic input/output system ("BIOS") **922**, which can form part of the ROM **918**, contains basic routines that help transfer information between elements within the computing environment **900**, such as during start-up.

The computing environment **900** may include a hard disk drive **924** for reading from and writing to a hard disk **926** (including a solid state memory device), an optical disk drive **928** for reading from and writing to removable optical disks **932**, and/or a magnetic disk drive **930** for reading from and writing to magnetic disks **934**. The optical disk **932** can be a CD-ROM, while the magnetic disk **934** can be a magnetic floppy disk or diskette. The hard disk drive **924**, optical disk drive **928** and magnetic disk drive **930** may communicate with the processing unit **912** via the system bus **916**. The hard disk drive **924**, optical disk drive **928** and magnetic disk drive **930** may include interfaces or controllers (not shown) coupled between such drives and the system bus **916**, as is known by those skilled in the relevant art. The drives **924**, **928** and **930**, and their associated computer-readable storage media **926**, **932**, **934**, may provide nonvolatile and non-transitory storage of computer readable instructions, data structures, program modules and other data for the computing environment **900**. Although the depicted computing environment **900** is illustrated employing a hard disk **924**, optical disk **928** and magnetic disk **930**, those skilled in the relevant art will appreciate that other types of computer-readable storage media that can store data accessible by a computer may be employed, such as magnetic cassettes, flash memory, solid state drives, digital video disks ("DVD"), Bernoulli cartridges, RAMs, ROMs, smart cards, etc. For example, computer-readable storage media may include, but is not limited to, random access memory (RAM), read-only memory (ROM), electrically erasable programmable read-only memory (EEPROM), flash memory, compact disc ROM (CD-ROM), digital versatile disks (DVD) or other optical disk storage, magnetic cassettes, magnetic tape, magnetic disk storage or other magnetic storage devices, solid state memory or any other medium which can be used to store the desired information and which may be accessed by processing unit **912***a*.

Program modules can be stored in the system memory **914**, such as an operating system **936**, one or more application programs **938**, other programs or modules **940** and program data **942**. Application programs **938** may include instructions that cause the processor(s) **912** to perform generating digital roof models, generating roof and floor area measurements, and store and display input images or images generated by generating digital roof models and generating roof and floor area measurements, including the processes described herein. Other program modules **940** may include instructions for handling security such as password or other access protection and communications encryption. The system memory **914** may also include communications programs, for example, a Web client or browser **944** for permitting the computing environment **900** to access and exchange data including digital images, roof measurements and other building data with sources such as Web sites of the Internet, corporate intranets, extranets, or other networks and devices, as well as other server applications on server computing systems. The browser **944** in the depicted embodiment is markup language based, such as Hypertext Markup Language (HTML), Extensible Markup Language (XML) or Wireless Markup Language (WML), and operates with markup languages that use syntactically delimited characters added to the data of a document to represent the structure of the document. A number of Web clients or browsers are commercially available such as those from Mozilla, Google, and Microsoft of Redmond, Wash.

While shown in FIG. **9** as being stored in the system memory **914**, the operating system **936**, application programs **938**, other programs/modules **940**, program data **942** and browser **944** can be stored on the hard disk **926** of the hard disk drive **924**, the optical disk **932** of the optical disk drive **928** and/or the magnetic disk **934** of the magnetic disk drive **930**.

An operator can enter commands and information into the computing environment **900** through input devices such as a touch screen or keyboard **946** and/or a pointing device such as a mouse **948**, and/or via a graphical user interface in order to receive, process, store and send data on which floor area measurement estimation has been or will be performed as described herein. Other input devices can include a microphone, joystick, game pad, tablet, scanner, etc. These and other input devices are connected to one or more of the processing units **912** through an interface **950** such as a serial port interface that couples to the system bus **916**, although other interfaces such as a parallel port, a game port or a wireless interface or a universal serial bus ("USB") can be used. A monitor **952** or other display device is coupled to the system bus **916** via a video interface **954**, such as a video adapter which may be configured to display images used by or generated by floor area measurement estimation as described herein. The computing environment **900** can include other output devices, such as speakers, printers, etc.

The computing environment **900** can operate in a networked environment using logical connections to one or more remote computers and/or devices. For example, the computing environment **900** can operate in a networked environment using logical connections to one or more other computing systems, mobile devices and other service providers or information servers that provide the digital images in various formats or by other electronic delivery methods. Communications may be via a wired and/or wireless network architecture, for instance wired and wireless enterprise-wide computer networks, intranets, extranets, telecommunications networks, cellular networks, paging networks, and other mobile networks.

FIG. **10** is an example screenshot **702** of a user interface of a floor plan editor tool for generating floor area measurements, which may be used independently of, as part of, or integrated with the systems and methods for generating a risk management report described herein. In one embodiment, the tool consists of a floor plan editor **300**, a facet label editor **302**, and control buttons **304**. The floor plan editor **300** consists of an approximately orthogonal view of the property **306** over which the software operator can draw shapes, such as rectangles, to outline the dimensions and area of different approximate floor areas of different sections of the house or building **308**. The facet label editor **302** is a window that displays multiple aerial views of the property. In this example, the operator is looking at a West view which is indicated in area **310**. Below this area there are a series of thumbnail images **314**, with the current image being viewed highlighted **312**. The highlighted image **312** indicates the expanded view of the image shown below **320**. The operator, when drawing the floor areas **308**, uses the multiple views of the property that are referenced by the thumbnail images **314** to determine the various features and facet types of the building for which the operator wants to estimate a floor area. An example of these facet types and features are listed in the facet label editor as facet type buttons **316**. These facet types include, but are not limited to, footprint **316***a*, outbuilding **316***b*, garage **316***c*, first floor **316***d*, second floor **316***e*, third floor **316***f*, deck **316***g*, patio **316***h*, and porch **316***i*. The operator may select one of these buttons to associate one floor plan shape drawn on the building **308**.

Control buttons **304** allow the operator to adjust floor plan shapes and choose different views of the property to show on the facet label editor **302**. The operator can select the image **320** to display by using either the left arrow **318***a* or the right arrow **318***b* to move the selected thumbnail image, in this case image **312**, to the desired image to be shown. Selecting different aerial images of the property taken at different angles allows the operator to better understand the structure of the building to determine the number of floors, the levels, garages, decks, patios, porches, or other features of the building. The erode button **330** allows a floor plan shape that is selected from among the number of floor plan shapes **308** to have its edges slightly reduced, for example, by 16 inches to 18 inches. Conversely, the dilate button **332** will enlarge the size of the selected shape by a small amount. The erode and dilate features are used as fine-tune adjustments by the operator to adjust the rectangle shape to the approximate floor plan of the building section that is being estimated. The checklist button **322** will take the user to the gathering property assessment screens described starting in FIG. **16**. When the operator has finished drawing all the shapes and is satisfied with the drawings of the floor plan, the operator selects the finish button **326**. To reject the changes and start over, the operator selects the reject button **324**.

FIG. **11** is an example screenshot **704** of the user interface of the system described in FIG. **10**. Here, the operator has zoomed in, using the floor plan editor, on the image showing the top of the building being measured **306**. In one embodiment, the operator uses a mouse to move cursor **336** to different locations over the house to draw rectangles that represents floor areas the operator wishes to measure. For example, if the operator wished to estimate the measurement of the deck **338**, the operator would first select the deck facet types button **316***g*, then on the floor plan editor image **306** select the four corners that appear to the operator to be the corners of deck **338**. Once the operator has completed this for all of the floor plan areas desired to be captured, the operator can go to the facet label editor thumbnail images **314** and select the top view, in this example by selecting thumbnail **340**, which shows the top view of the building in the facet label editor overlaid with the different facet types as identified by the operator. In this example, the facet types are differentiated by different names, such as garage, footprint, first floor, second floor, deck, etc. and are also distinguished by color: magenta, beige, blue, dark blue, gray, etc. In addition, the dimensions and the areas associated with each facet type footprint also appear in the same color in the floor plan editor overlaid on the top-down image **306**.

FIG. **12** is an example screenshot **706** of the user interface of the system from FIG. **10**. In this example, the user has selected thumbnail **342**, which is an oblique aerial view of the property facing east. The operator may use this view to verify the operator's choices of the different facet types for the floor areas.

FIG. **13** is an example screenshot **708** of the user interface of the system of FIG. **10**. Here, the operator has selected thumbnail **344**, which is a oblique aerial view of the property facing north, again to check whether the facet type selections for the floor area need any adjustment.

FIG. **14** is an example screenshot **710** of a user interface of the system of FIG. **10**. Here, the operator has zoomed in further on the north oblique-facing image **348** to better check and review the operator's assessment of the features of the building.

FIG. **15** is an example screenshot **712** of a user interface of the system of FIG. **10**. Here, the operator has selected the top thumbnail **340** to review the final floor plan selections and facet type selections for any final changes. If the operator is satisfied with the floor plan, the operator selects the finish button **326**.

FIG. **16** is an example screenshot **714** of a user interface of a system for gathering property assessment data for a property and the buildings on the property, which may be used independently of, as part of, or integrated with the systems and methods for generating a risk management report described herein, according to one non-limiting illustrated embodiment. For example, the screenshots of FIGS. **16-21** are screenshots of the graphical user interface of the gathering property assessment data, which performs the processes described in FIGS. **1A-1I** above.

Shown is a graphical user interface including two panels, one with an image of the property **346**, and one with a series of questions pertaining to the property to be answered **348**. In some embodiments, the answers may be provided by other data sources, or by the operator in viewing the pictures of the property in panel **346**.

In some embodiments the panel **346** may display various images of the property which can be viewed by selecting a tab **342**. The available images may come from different sources, may be of different perspectives (e.g. top-down versus oblique), and may have different image manipulation methods, for example viewing an image in Bing vs. Google. The operator can select a view of **342** and use the image displayed to answer questions **348** about the property. In screen **714**, the questions **348** have to do with a house on the property. In this example, the operator is asked a series of questions to be answered based on the operator's visual assessment of the property from the given aerial images. For example, the number of stories in the house, the type of structure, the number of corners, and total living area information of the structure, which can be either estimated or taken from the floor plan editor tool.

FIG. **17** is an example screenshot **716** of a user interface of the system for FIG. **16** for gathering property assessment data, according to one non-limiting illustrated embodiment. In this example, additional questions **350** regarding the house on the property have been answered by the operator.

FIG. **18** is an example screenshot **718** of a user interface of the system of FIG. **16** for gathering property assessment data according to one non-limiting embodiment. Here, the operator is asked for data regarding exposures to the property and to the house **352**, for example, the nearest nonresidential exposures, nearest steep slope, nearest water hazard, nearest natural vegetation exposure. In this example, the operator may either estimate and type the number directly into the answer area **354**, or the operator can use the get distance tool by clicking **356**. When the operator uses the get distance tool, in one embodiment the system presents the operator an image of the property and surrounding area **346** as well as a marker indicating the location of the property that is being evaluated **358**. The system displays a marker **360** which can be moved within the image to indicate the location that the distance should be measured to. Line **362** connects the marker showing the location of the property **358** to the floating marker that the user is able to place at the location of the exposure to which the distance needs to be determined.

FIG. **19** is an example screenshot **720** of a user interface of the system of FIG. **16** for gathering property assessment data according to one non-limiting illustrated embodiment. Screen **720** shows the results of using the get distance tool which was selected by pressing button **356** in screen **718**. In this example, the tool estimated the distance based on the top-down image scale **346**, and put the result in answer box **358**. In addition to measuring the distance, the operator is asked to identify the type of vegetation present around the property and also if there are any recreational vehicles, boats or motorcycles on the property.

FIG. **20** is an example screenshot **722** of a user interface for of the system of FIG. **16** for gathering property assessment data according to one non-limiting illustrated embodiment. In this example, the operator is asked about roof characteristics including how steep the roof is, the pitch of the roof (estimate), the type or style of the roof, for example, a hip or gabled roof versus a flat roof, the number of chimneys in the house, and the number of outbuildings on the property **360**.

FIG. **21** is an example screenshot **724** of a user interface of the system of FIG. **16** for gathering property assessment data according to one non-limiting illustrated embodiment. In this example, the operator is asked for additional information on the property **362**. For example, ground slope beneath the main structure on the property, whether there is a trampoline on the property, and whether there is a pool or hot-tub on the property. In this example, the operator is able to go back to previous screens by selecting previous button **364**. Otherwise, if the operator is finished with the property assessment data, the operator selects the finish button **366**.

FIG. **22** is an example page of a report **726** of a property risk management report according to one non-limiting illustrated embodiment. FIGS. **22-29** are examples of the presentation of data which is received from the processes described in FIGS. **1A-1F**. This example shows a top-down view of the property **368**, a title of the report **370**, the type of report **372**, in this case a custom residential report, a report date, property address, and insurance policy number related to the property, if available. Finally, the example includes the name and address of the individual or company for which the report was prepared **374**.

FIG. **23** is an example page **728** of a property risk management report example of FIG. **22**, according to one non-limiting illustrated embodiment. This example page shows, the date of the report, report details including a report number, an insurance policy number that is related, if any, the renewal date of the insurance policy related, if any, the date of the photo, and the geocoded location, for example, in latitude and longitude, of where the property exists. In addition, a building summary is presented which includes the year built, the number of stories, and the estimated living area, whether or not there is a garage, and whether the garage is attached.

FIG. **24** is an example page **730** of a property risk management report of FIG. **22**, according to one non-limiting illustrated embodiment. This example page contains a top view or orthogonal view **380** of the property.

FIG. **25**, is an example page **732** of a property risk management report of FIG. **22**, according to one non-limiting illustrated embodiment. This example page shows two orthogonal views of the property: a north view **382**, and a south view **384**.

FIG. **26** is an example page **734** of a property risk management report of FIG. **22**, according to one non-limiting illustrated embodiment. This example page shows two additional aerial oblique views of the property: an east view **386**, and a west view of the property **388**.

FIG. **27** is an example page **736** of a property risk management report, according to one non-limiting illustrated embodiment. The example page includes total estimated living area **390**, number of stories **392**, and an indicator of the floor level **393** and the area and dimension diagram of the features for that floor in diagram form **404**. A color-coded key **394** is used to identify the different features of the floor diagram **404** being shown. The example of this report has a color key **394** for each feature area, which corresponds to colors of the features shown in diagram **404**, namely the living area **398** in light blue, the garage area **396** in peach, the deck area **400** in maroon, etc. In addition, there is a compass rose **402** to orient the position of the buildings on the property.

FIG. **28** is an example page **738** of a property risk management report of FIG. **22**, according to one non-limiting illustrated embodiment. This example page describes the second floor and shows the dimensions and area for the living area in light blue **406** and the footprint in grey **408**.

FIG. **29** is an example page **740** of a property risk management report of FIG. **22**, according to one non-limiting illustrated embodiment. This examples page includes a confidence rating **410** that allows the operator in the gathering property assessment data tool discussed above to indicate the operator's level of confidence in the ratings and estimations given for the property. Structural observations **412** include year built, number of stories, type of family structure, footprint, number of corners, estimated total living area, garage area, garage type, deck area, patio area, porch area, estimated roof pitch, roof shape, number of chimneys, outbuilding count, outbuilding total area, basement area, finished basement area, basement type, basement description. Property observations **413** include whether there is a building permit, whether an EagleView roof report was completed, whether an EagleView wall report was completed, property distance to a commercial exposure, property distance to a steep slope, property distance to a water hazard, property distance to vegetation, type of vegetation, cross-sell identification, slope on property, existence of a trampoline, swimming pool/hot tub, the location of the nearest responding fire station, the type of responding fire station, property distance of the responding fire station, and whether the structure is owner occupied.

The various embodiments described above can be combined to provide further embodiments. All of the U.S. patents, U.S. patent application publications, U.S. patent applications, foreign patents, foreign patent applications and non-patent publications referred to in this specification and/or listed in the Application Data Sheet are incorporated herein by reference, in their entirety. Aspects of the embodiments can be modified, if necessary to employ concepts of the various patents, applications and publications to provide yet further embodiments.

These and other changes can be made to the embodiments in light of the above-detailed description. In general, in the following claims, the terms used should not be construed to limit the claims to the specific embodiments disclosed in the specification and the claims, but should be construed to include all possible embodiments along with the full scope of equivalents to which such claims are entitled. Accordingly, the claims are not limited by the disclosure.

The invention claimed is:

1. A computing system for generating an estimated floor area measurement, the computing system comprising:

one or more processor;

a non-transitory memory;

computer executable instructions for floor area measurement estimation stored on the non-transitory memory and that, when executed, cause the one or more processor to:

receive a first aerial image of a building having a roof, and a second aerial image of the building from at least one image file database, the first aerial image representing a top-down view of the top of the building, the second aerial image representing a view from a different angle than the top-down view of the building;

generate, a three-dimensional computer model of the roof, by analyzing the first aerial image and the second aerial image;

determine a total number of stories the building has using the second aerial image of the building;

determine, based at least in part on the determined total number of stories of the building and the three-dimensional computer model, an estimated floor area measurement of the building; and

output a floor area measurement report having floor area data thereon, the floor area data including the estimated floor area measurement.

2. The computing system of claim **1** wherein the generating the estimated floor area measurement includes:

calculating roof edge measurements assuming each section of the roof has no slope regardless of an actual slope of each section of the roof;

using the roof edge measurements to calculate an estimated total roof area of the roof assuming each section of the roof has no slope; and

generating the estimated floor area measurement based on the calculated estimated total roof area of the roof.

3. The computing system of claim **2** wherein the generating the estimated floor area measurement further comprises:

subtracting an amount from one or more of the roof edge measurements corresponding to an estimated roof overhang over one or more walls of the building to obtain adjusted roof edge measurements; and

generating the estimated floor area measurement based on the adjusted roof edge measurements.

4. The computing system of claim **2** wherein the generating the estimated floor area measurement further comprises:

subtracting an amount from one or more of the adjusted roof edge measurements corresponding to an estimated wall width to obtain adjusted roof edge measurements; and

generating the estimated floor area measurement based on the adjusted roof edge measurements.

5. The computing system of claim **1**, wherein the generating the estimated floor area measurement includes:

receiving information regarding one or more sections of the roof below which one or more of the stories laterally extends;

generating an estimated total roof area of the roof assuming each section of the roof has no slope regardless of an actual slope of each of the roof sections; and

generating the estimated floor area measurement based on a total area of the one or more sections of the roof under which the one or more of the stories laterally extends and the generated estimated total roof area of the roof.

6. The computing system of claim **1**, wherein the computer executable instructions for floor area measurement estimation, when executed, further cause the one or more processor to generate and deliver a floor area measurement estimate report that includes one or more aerial images of the building annotated with numerical values that indicate the corresponding estimated floor area measurement.

7. The computing system of claim **6**, wherein the computer executable instructions for floor area measurement estimation, when executed, further cause the one or more processor to generate and deliver a floor area measurement estimate report that is annotated with a floor area measurement and one or more of: slope, area, and length of edges of at least some of a plurality of planar roof sections of the roof.

8. The computing system of claim **1**, wherein the computer executable instructions for floor area measurement estimation, when executed, further cause the one or more processor to deliver the floor area measurement estimate as part of a report including a plurality of floor area measurement estimates for a plurality of buildings in response to a request for a plurality of estimates from a single entity.

9. A non-transitory computer-readable medium whose contents enable a computing system to generate an estimated floor area measurement, by performing a method comprising:

receiving a first and a second aerial image of a building having a roof, the first aerial image being a top-down view of the building and the second aerial image being a view from a different angle than the top-down view such that each of the aerial images providing a different view of the roof of the building;

correlating the first aerial image with the second aerial image;

determining a total number of stories the building has using the second aerial image of the building;

generating, based at least in part on the correlation between the first and second aerial images, a three-dimensional model of the roof that includes a plurality of planar roof sections that each have a corresponding slope, area, and edges;

generating an adjusted roof model by adjusting a slope of the planar roof sections in the three-dimensional model of the roof to zero;

obtaining an estimated total roof area measurement based on the adjusted roof model; and

generating, based at least in part on the estimated total roof area measurement and the determined total number of stories, an estimated floor area measurement of the building.

10. The non-transitory computer-readable medium of claim **9**, wherein the generating the estimated floor area measurement of the building includes:

subtracting an amount from one or more of roof edge measurements obtained from the adjusted roof model corresponding to an estimated roof overhang over one or more walls of the building to obtain adjusted roof edge measurements; and

generating the estimated floor area based on the adjusted roof edge measurements.

11. The non-transitory computer-readable medium of claim **9**, wherein the contents further enable a computing system to deliver the estimated floor area in response to a request.

12. A floor area measurement report produced by a process comprising:

receiving a first aerial image of a building, and a second aerial image of the building from at least one image file database, the first aerial image representing a top-down view of the top of the building, the second aerial image representing a view from a different angle than the top-down view of the building;

generating a computer model of a roof of the building based on the first aerial image, and the second aerial image;

determining a total number of stories the building has using the second aerial image of the building;

generating, based at least in part on the generated computer model, and the total number of stories of the building, an estimated floor area measurement of the building; and

electronically communicating the estimated floor area measurement.

13. The floor area measurement report of claim **12** wherein the generating the estimated floor area measurement includes:

receiving information regarding one or more sections of the roof below which one or more of the stories laterally extends;

generating an estimated total roof area of the roof assuming each section of the roof has no slope regardless of an actual slope of each of the roof sections; and

generating the estimated floor area measurement based on a total area of the one or more sections of the roof under which the one or more of the stories laterally extends and the generated estimated total roof area of the roof.

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